United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil and Water Science Department, and the Florida Department of Agricultural and Consumer Services

Soil Survey of Collier County Area, Florida

How to Use This Soil Survey

General Soil Map

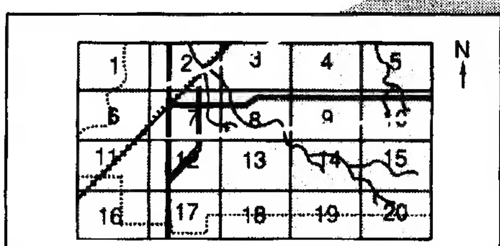
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

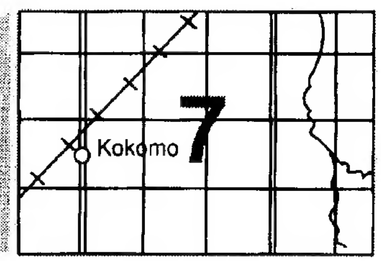
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

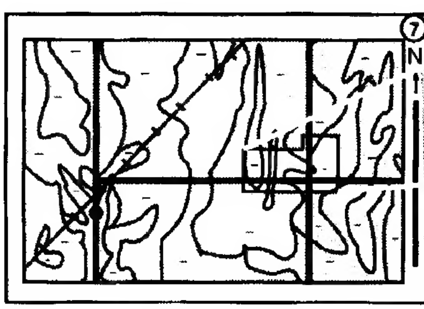


INDEX TO MAP SHEETS



MAP SHEET

Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.



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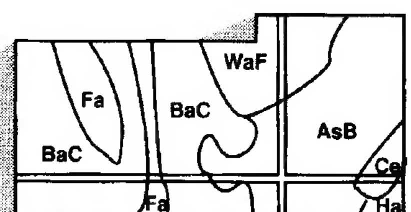

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1990. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1990. This survey was made cooperatively by the Natural Resources Conservation Service; the University of Florida's Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil and Water Science Department; and the Florida Department of Agricultural and Consumer Services. The survey is part of the technical assistance furnished to the Collier Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: A color infrared satellite image of the southwestern part of the survey area. The lighter colors indicate areas of urban development, the reddish colors indicate the wetter areas, and the greenish colors indicate areas that have actively growing vegetation. The Gulf of Mexico is on the left side of the image. Photo courtesy of the South Florida Water Management District.

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Issued 1998

Summary of Tables

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

T. Niles Glasgow

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State Conservationist
Natural Resources Conservation Service

Soil Survey of
Collier County Area, Florida

By Kenneth Liudahl, David J. Belz, Lawrence Carey, Robert W. Drew, Steve Fisher, and Robert Pate, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil and Water Science Department, and the Florida Department of Agriculture and Consumer Services

The survey area is in the extreme southwestern part of peninsular Florida (fig. 1). Collier County is bounded by Lee and Hendry Counties to the north, Hendry and Broward Counties to the east, Monroe County and the Gulf of Mexico to the south, and by the Gulf of Mexico to the west. The survey area covers 759,200 acres of the 1,348,400 total acres in Collier County. The Big Cypress National Preserve and the Everglades National Park areas, in the eastern part of Collier County, were not included in the survey area.

Tourism and related services are the largest nonagricultural industries in the county. Naples, the county seat, is the center for tourism. It is in the southwestern part of the county. Winter fresh-market vegetables and citrus crops are the largest agricultural industries in the county. Immokalee, in the north-central part of the county, is the center for the agricultural industry.

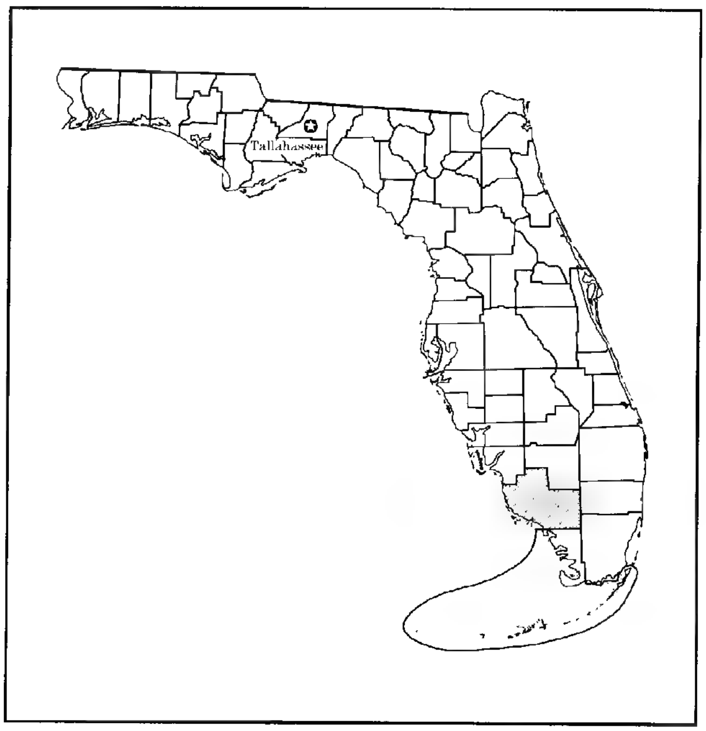

Figure 1.—Location of the survey area in Florida.

General Nature of the County

This section provides general information about the county, including climate, history and development, water resources, farming, and geology.

Climate

Table 1 gives data on temperature and precipitation for the survey area, as recorded in the period 1944 to 1983 at Fort Myers, located 20 miles north of Collier County.

The annual average temperature is nearly 74 degrees. Monthly averages range from the low sixties in January to the low eighties in the summer months. Winters are mild and have many bright, warm days and moderately cool nights. From November to March, the maximum temperatures average in the middle to high seventies, and minimum temperatures average in the low to middle fifties.

During occasional cold periods, temperatures drop into the thirties. Only occasionally does the temperature drop below 32 degrees, and rarely does it drop into the twenties. Frost occurs in the farming areas only a few times each year, and it is generally light and scattered. In the summer, the maximum temperature averages in the low nineties from June through the first part of September. The daily maximum is 90 degrees or more for over 80 percent of the days during this period. The maximum temperature has rarely reached 100 degrees.

The average annual rainfall is over 50 inches. About two-thirds of the rain falls from June to September. During this period, the average is nearly 8 inches per month. In the drier half of the year, the monthly rainfall average is less than 2 inches during the period from November through January and averages a little over 2 inches from February through April. In winter the survey area generally receives only very light rainfall or no rain falls for long periods. During the summer, most of the rain falls during late afternoon or early evening thundershowers that provide a cooling effect for hot summer days. The thundershowers seldom last long, although they often yield large amounts of rain. Exceptions occur during the late summer or fall, when tropical storms or hurricanes can pass near the Fort Myers and Naples area. These storms can result in a heavy downpour that can reach torrential proportions. Six to 10 or more inches of rain can fall during a 24-hour period. A trace amount of snow was officially observed only once, in February 1899.

The prevailing wind direction is from the east. High wind velocities are not generally experienced except during the passage of a tropical storm. During winter and spring, a few days generally experience winds that range from 20 to 30 miles per hour. Thunderstorms are sometimes accompanied by strong gusts of winds for a brief period. Wind speeds of approximately 100 miles per hour have been experienced with the passage of a hurricane during the fall. The chance of a hurricane passing through the area in any given year is about one in twelve.

Thunderstorms can occur during any month, but they are infrequent from November to April. From June through September, they occur on an average of 2 out of every 3 days, generally during the late afternoon or early evening. The appearance of heavy fog is rather infrequent, occurring mostly in the winter during early morning. Most of the fog appears as a shallow ground fog that rapidly burns off after sunrise. The sun shines at some time almost every day.

The relative humidity is high during the night, averaging from 80 to 90 percent. It drops off to an average of 50 to 60 percent during the middle of the day.

History and Development

Ron Jamro, director, Collier County Museum, prepared this section.

Collier County was the 62nd county created in Florida. It has the third largest total land area in the state.

The region has been occupied by humans for a known period of at least 8,000 years, beginning with nomadic bands of Paleo and early Archaic Indians who migrated down the Florida peninsula in search of abundant game. Over the centuries, this primitive hunting culture evolved into a more settled society, concentrated primarily in towns and villages along the coastal fringe of southwestern Florida.

Known as the Calusa, this advanced and powerful society developed a complex religious and economic structure, engineered canals, earthworks, and temples, and exerted political control over much of southern Florida by the time the Spanish arrived in the 16th century.

In 1513, Juan Ponce de Leon led the first exploration of Florida and the lower Gulf Coast. He is believed to have landed in the vicinity of Cape Romano or at Caxambas on what is now Marco Island. Although the Spanish attempts to colonize the southwestern tip of Florida failed, the once dominant Calusa had virtually disappeared by the early 1700s as a result of enslavement, warfare, and contact with European diseases. A tribal remnant may have survived among the Spanish fishing operations that were based as far south as Marco Island. The huge quantities of dried and salted fish produced at these "ranchos" by Spanish and Indian workers were sold profitably in Cuban markets well into the 20th century.

A brief period of British rule that began in 1763 encouraged the gradual movement south of scattered bands of Indians from the Creek Confederacy. These tribal groups, known collectively as "Seminole," reached the Big Cypress Swamp region of what is now Collier County as a result of the Second Seminole War (1835-42) and, later, the Third Seminole War (1855-58). Military action in the area, although inconclusive and relatively minor in extent, gave impetus for further exploration in the area.

The maze of inlets and waterways of the Ten Thousand Islands was used by Confederate blockade runners during the Civil War. Tales abound about army deserters and fugitives from the law who took refuge in the area after the war.

Modern-day settlement of the survey area evolved slowly and in isolated pockets during the 1870s and 1880s. Small pioneer fishing and farming communities emerged at Everglade, Naples, Marco, and Chocoloskee. Further inland, at Immokalee, cattle ranching became a primary means of livelihood.

Collier County was created in 1923 and had a

population of less than 1,200 people. The creation of the county and much of its early economic development were closely tied to the financial resources and vision of a Memphis-born millionaire, Barron Collier. Backed by a personal fortune amassed from streetcar advertising, Collier completed the Tamiami Trail in 1928, thus unlocking the area's enormous agricultural and resort potential. The Atlantic Coast Line Railroad extended its tracks to Immokalee in 1921 and, later, to Naples and Marco Island in 1926. A second railroad, the Seaboard Air Line, reached Naples in 1927.

By 1935, the town of Ochopee had become the center of a very large tomato-growing and packing industry. Florida's first commercial oil well was brought in at Sunniland in 1943, and the county's cypress logging industry flourished at Copeland well into the 1950s.

Although severely stunted by the onset of the Great Depression, Collier County's population and economic development accelerated at an impressive pace at the end of World War II. In the short span of thirty years, the number of residents swelled from 6,488 in 1950 to 85,000 in 1980.

The county seat was moved from Everglades City to Naples in 1962. This move signalled a new era of sustained growth in agriculture, tourism, and construction that have made Collier County one of the fastest developing areas in the United States today.

Water Resources

Steve Mozley, district conservationist, Natural Resources Conservation Service, prepared this section.

The primary source of water in the survey area is ground water, which is in three major aquifers. These aquifers are the Floridan, Intermediate, and Surficial aquifer systems. The Floridan aquifer is the deepest and is characterized by poor water quality. The Intermediate aquifer has limited quantities of available water. The Surficial aquifer is closest to the surface and is the most important source of water for public uses.

The water in the Surficial aquifer is primarily replenished by rainfall. The aquifer's vicinity to the surface increases the risk of contamination from pollution.

An extensive network of canals has been excavated to drain areas of the county for human habitation and other uses. This drainage system has reduced the retention time of water falling as rain, resulting in a reduction of nutrient uptake by plants which, in turn, affects water quality and reduces the time available for water to infiltrate the soil for aquifer replenishment. The intrusion of salt water is another concern, and it has occurred in some areas along the coast.

Collier County officials and government recognize these water resource concerns and, in an effort to protect the county's water resources, are creating water-control structures, providing ground-water monitoring and data gathering, and restricting activities known to adversely affect the quality and quantity of water.

Farming

Steve Mozley, district conservationist, Natural Resources Conservation Service, prepared this section.

The soils and climate of Collier County are favorable for farming and agricultural industries. The most common vegetable crop in the survey area is tomatoes. Other vegetables grown in the county are peppers, cucumbers, squash, potatoes, sweet corn, onion, and green beans. The most common fruit crop is oranges. Other fruits grown include watermelons, avocados, and strawberries. Other farming-related activities include the production of gladiolus and ornamentals.

Livestock production consists mainly of beef cattle. A combination of native rangeland and improved pasture is used as forage sources.

Many areas in the county, especially in the western part, that were once native rangeland or cropland have been converted to urban land.

Geology

Kenneth M. Campbell, geologist, Florida Geological Survey, Department of Natural Resources, prepared this section.

Although several authors have discussed the geomorphology of the Florida peninsula, the classification detailed by White in 1970 is the basis of this section *(11)*. Collier County lies within the Southern or Distal Physiographic Zone. The dominant geomorphic features in the county include the Immokalee Rise, the Big Cypress Spur, and the Southwestern Slope *(11)* (fig. 2). The remainder of the county falls within the Gulf Coastal Barrier Chain and Lagoons, Reticulated Coastal Swamps, and the Ten Thousand Islands.

The Immokalee Rise is located primarily in Hendry County, but it extends into the eastern part of Lee County and the northeastern part of Collier County. The Immokalee Rise is bounded on the north by the Caloosahatchee Valley, on the east by the Everglades, on the south-southeast by the Big Cypress Spur, and on the southwest by the Southwestern Slope *(11)*. The boundaries between these features are poorly defined. The Immokalee Rise is described by White as a "southerly extension of Pamlico(?) marine sand invading the Distal Zone from the sand dominated Central Zone to the north." White further states that the rise appears to have formed as a submarine shoal that extended southward from a mainland cape during the Late Pleistocene epoch. Relict

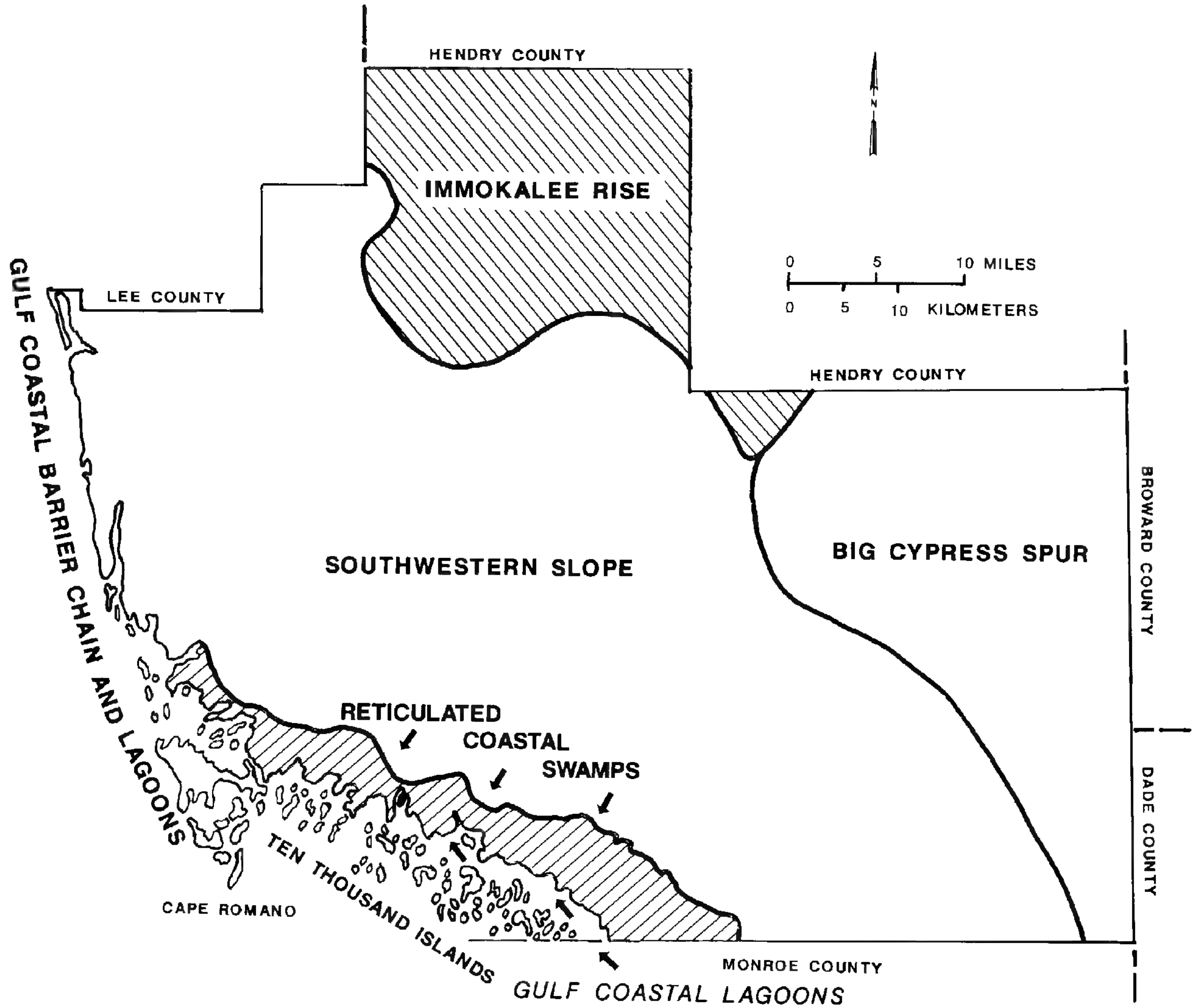

Figure 2.—Geomorphic features of the Collier County area.

shoreline features are only weakly developed, apparently because of low energy conditions that existed as the shoal emerged from the receding sea *(11)*. The Immokalee Rise is at an elevation of 25 to 42 feet above mean sea level (MSL) *(6)*, and it dips very gently to the southwest. Numerous small karst lakes are located along the margin of the rise *(11)*.

The Big Cypress Spur is a transitional feature between the Immokalee Rise, the Everglades Trough, and the Southwestern Slope. The elevation of the spur is only slightly higher than that of the Everglades and the Southwestern Slope. Drainage is from the north, from the Immokalee Rise to the Everglades and the Southwestern Slope. The Big Cypress Spur is characterized by large areas of limestone or marl exposed at the surface, as well as areas of sandy or peaty soils *(6, 4)*.

The Southwestern Slope is at an elevation below about 25 feet above MSL *(6)*. It is between the Gulf of Mexico and the western edges of the Immokalee Rise and the Big Cypress Spur. Drainage is to the southwest. Most of this area has a thin mantle of sand, which generally becomes more thick to the north, overlying an eroded Tamiami Formation limestone surface *(4)*.

Cape Romano forms the southern end of the quartz

sand-dominated Gulf Barrier Island Chain. Most of the quartz sand transported past Cape Romano is deposited in a large shoal complex south of the cape. North of Cape Romano, the Collier County coastline consists of barrier islands and lagoons.

The Ten Thousand Islands are located to the south of Cape Romano. This feature is transitional between the quartz sand-dominated barrier island coastline to the north and the carbonate-dominated, quartz-deficient shoreline to the south. Sufficient quartz sand is present to form beaches on the gulf side of the outermost islands, but not enough is present to allow the beaches to coalesce *(11)*. The outer islands are often on a core composed of vermetid (gastropod) reef rock *(7)*. The inner islands are generally composed of oyster reefs. Both types of islands are generally topped by mangrove swamps *(11)*.

The Reticulated Coastal Swamps border the Gulf Coast in the southern part of Collier County. These swamps are tidally influenced, complexly channeled mangrove swamps and coastal marshes. They are at an elevation of less than five feet above mean sea level. Thin deposits of organic material and marl overlie limestone and calcareous sandstone of the Tamiami Formation *(6)*.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the general pattern of drainage, the kinds of crops and native plants growing on the soils, and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Ground Penetrating Radar

In this survey area, a ground penetrating radar (GPR) system *(3)* and hand transects were used to determine and document the type of variability of the soils in the detailed soil map units. Hundreds of random transects were made with the GPR and by hand. Information from notes on observations made in the field were used with radar data from this study to classify the soils and to determine the composition of map units. The map units, as described in the section "Detailed Soil Map Units" are based on these data.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils of the Manmade Areas

The general soil map unit in this group consists of nearly level, somewhat poorly drained and poorly drained soils that were filled or excavated to accommodate houses, commercial buildings, roads, parking lots, and other urban land uses. Some of the soils are sandy throughout because they formed naturally or were composed of sandy fill material. Other soils are sandy and loamy because they formed naturally or were composed of mixed sandy and loamy fill material. Some of the fill material contains gravel.

1. Urban Land-Udorthents-Holopaw-Immokalee

Areas of Urban land and nearly level, somewhat poorly drained and poorly drained soils that consist of mixed sandy and loamy fill over limestone bedrock, that are sandy throughout, or that are sandy and have a loamy subsoil

This map unit is mostly in the cities of Naples, Immokalee, and Marco Island. Another large area is mapped in the Golden Gate Development area, east of Naples.

This map unit consists of nearly level, somewhat poorly drained to poorly drained soils composed of sandy and loamy fill material. Some areas consist of undisturbed, poorly drained sandy soils. Natural vegetation is scarce, but it consists of scattered slash pine, saw palmetto, grasses, and weeds. Most areas have been artificially drained by canals and ditches.

This map unit makes up about 37,689 acres, or about 5.5 percent of the survey area. It is about 55 percent Urban land, 14 percent Udorthents, 5 percent Holopaw soils, 5 percent Immokalee soils, and 21 percent soils of minor extent.

Urban land consists of commercial buildings, houses, parking lots, streets, sidewalks, shopping centers, and other urban areas where the soil cannot be observed.

No single pedon represents Udorthents, but a common profile has a mixed layer of grayish brown and pale brown fine sandy loam to a depth of 18 inches. The next layer is gray gravelly fine sand to a depth of 37 inches. The subsoil is light brownish gray fine sand to a depth of about 47 inches. Limestone bedrock is at a depth of about 47 inches.

Holopaw soils are poorly drained. Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 52 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 62 inches. The upper part of the subsoil is dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. The substratum is gray loamy fine sand to a depth of about 80 inches.

Immokalee soils are poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is light gray fine sand to a depth of about 35 inches. The subsoil is fine sand to a depth of about 58 inches. The upper part of the subsoil is black, the next part is dark reddish brown, and the lower part is dark brown. The substratum is pale brown fine sand to a depth of about 80 inches.

The soils of minor extent in this map unit are Hilolo, Malabar, Myakka, Tuscawilla, Pomello, Satellite, Jupiter, Margate, and Ft. Drum soils.

Most areas of this unit are presently used as urban land or are being prepared for future urban uses.

Soils of the Flatwoods, Sloughs, and Hammocks

The four general soil map units in this group consist of nearly level, poorly to very poorly drained soils. Some are

sandy soils that overlie limestone at a depth of 10 to 60 inches; some are deep, sandy soils that have a loamy or organically coated subsoil; and some are sandy throughout the profile and have an organically coated subsoil. The soils in this group are on flatwoods, in sloughs, or on hammocks throughout the survey area.

2. Immokalee-Oldsmar-Basinger

Nearly level, poorly drained, sandy soils that have a weakly to strongly developed, organically coated subsoil or that have a loamy subsoil

This map unit consists of 3 large areas and several smaller areas. The larger areas are nearly circular to square in shape. They are each about 10 miles wide and 10 miles long, and they are located north, southwest, and south of Immokalee. The smaller areas are west of Immokalee and north and south of Naples.

This map unit consists of nearly level, poorly drained soils on flatwoods and in sloughs. The natural vegetation on the flatwoods consists mainly of saw palmetto and some scattered areas of South Florida slash pine, waxmyrtle, and gallberry. The natural vegetation in the sloughs consists of scattered areas of slash pine, scrub cypress, cabbage palm, saw palmetto, waxmyrtle, sand cordgrass, pineland threeawn, panicums, and chalky bluestem.

This map unit makes up about 129,278 acres, or about 18.9 percent of the survey area. It is about 35 percent Immokalee soils, 32 percent Oldsmar soils, 8 percent Basinger soils, and 25 percent soils of minor extent.

Immokalee soils are poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is light gray fine sand to a depth of about 35 inches. The subsoil is fine sand to a depth of about 58 inches. The upper part of the subsoil is black, the next part is dark reddish brown, and the lower part is dark brown. The substratum is pale brown fine sand to a depth of about 80 inches.

Oldsmar soils are poorly drained. Typically, the surface layer is dark grayish brown fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 35 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 80 inches. The upper part of the subsoil is black fine sand, the next part is very dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam.

Basinger soils are poorly drained. Typically, the surface layer is grayish brown fine sand about 3 inches thick. The subsurface layer is light gray fine sand to a depth of about 25 inches. The subsoil is brown fine sand to a depth about 44 inches. The substratum is brown fine sand to a depth of about 80 inches.

The soils of minor extent in this map unit are Hilolo, Malabar, Myakka, Tuscawilla, Pomello, Satellite, Jupiter, Margate, and Ft. Drum soils.

The soils in this map unit are used mostly for the production of citrus, vegetable, and other crops. Some areas have been used for urban development.

3. Holopaw-Malabar-Basinger-Immokalee

Nearly level, poorly drained, sandy soils; some have a weakly to strongly organically coated subsoil and some have a loamy subsoil

This map unit consists of several small mapped areas throughout the county. The largest unit is about 6 miles long and 3 miles wide. It is south of the Lee County line, about 4 miles east of U.S. Highway 41, and stretches south to the Golden Gate Airport.

This map unit consists of nearly level, poorly drained soils on flatwoods and in sloughs. The natural vegetation in the sloughs is scattered areas of South Florida slash pine, scrub cypress, cabbage palm, saw palmetto, waxmyrtle, sand cordgrass, pineland threeawn, panicum, and chalky bluestem. The natural vegetation on the flatwoods is dominantly saw palmetto and scattered areas of South Florida slash pine, waxmyrtle, gallberry, cabbage palm, chalky bluestem, and pineland threeawn.

This map unit makes up about 62,712 acres, or about 9.2 percent of the survey area. It is about 38 percent Holopaw soils, 26 percent Malabar soils, 17 percent Basinger soils, 8 percent Immokalee soils, and 11 percent soils of minor extent.

Holopaw soils are poorly drained. Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 52 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 62 inches. The upper part of the subsoil is dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. The substratum is gray loamy fine sand to a depth of about 80 inches.

Malabar soils are poorly drained. Typically, the surface layer is dark gray fine sand about 2 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 72 inches. The upper part of the subsoil is brownish yellow and yellow fine sand, the next part is very pale brown and light gray fine sand, and the lower part is grayish brown, mottled sandy clay loam. The substratum is light gray fine sand that has about 10 percent shell fragments to a depth of about 80 inches.

Basinger soils are poorly drained. Typically, the surface layer is grayish brown fine sand about 3 inches thick. The subsurface layer is light gray fine sand to a depth of about

25 inches. The subsoil is brown fine sand to a depth of about 44 inches. The substratum is brown fine sand to a depth of about 80 inches.

Immokalee soils are poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is light gray fine sand to a depth of about 35 inches. The subsoil is fine sand to a depth of about 58 inches. The upper part of the subsoil is black, the next part is dark reddish brown, and the lower part is dark brown. The substratum is pale brown fine sand to a depth of about 80 inches.

The soils of minor extent in this unit are Pineda and Riviera soils.

The soils in this map unit are used mostly for the production of citrus, vegetable, and other crops. A few areas have been used for urban development or have been left in natural vegetation.

4. Holopaw-Wabasso-Winder

Nearly level, poorly drained and very poorly drained, sandy soils that have a loamy subsoil; some also have an organically coated subsoil

This map unit consists of several small mapped areas in the northern part of the survey area. It consists of nearly level, very poorly to poorly drained soils on the flatwoods in sloughs and in small closed depressions.

The natural vegetation on the flatwoods is dominantly saw palmetto and scattered areas of South Florida slash pine, gallberry, and waxmyrtle. The natural vegetation in the sloughs is scattered areas of South Florida slash pine, scrub cypress, cabbage palm, saw palmetto, waxmyrtle, sand cordgrass, pineland threeawn, panicums, and chalky bluestem. The natural vegetation in the closed depressions is pickerelweed, St. Johnswort, and maidencane.

This map unit makes up about 41,842 acres, or about 6.1 percent of the survey area. It is about 38 percent Holopaw soils, 22 percent Wabasso soils, 13 percent Winder soils, and 27 percent soils of minor extent.

Holopaw soils are poorly drained. Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 52 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 62 inches. The upper part of the subsoil is dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. The substratum is gray loamy fine sand to a depth of about 80 inches.

Wabasso soils are poorly drained. Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer is gray fine sand. The subsoil extends to a depth of about 70 inches. The upper part of the subsoil is black and very dark grayish brown fine sand; the next part is light yellowish brown and gray, mottled sandy clay loam; and the lower part is yellowish brown, mottled sandy clay loam. The substratum is light gray, mottled loamy fine sand to a depth of about 80 inches.

Winder soils are very poorly drained. Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 50 inches. The upper part of the subsoil is gray fine sandy loam, the next part is gray sandy clay loam, and the lower part is dark gray sandy clay loam. The substratum is white fine sandy loam to a depth of about 80 inches.

The soils of minor extent in this unit are Malabar, Pineda, Riviera, Winder, Gator, Okeelanta, and Immokalee soils.

The soils in this map unit are used mostly for the production of citrus, vegetable, and other crops. A few areas have been left in natural vegetation.

5. Pineda-Boca-Hallandale

Nearly level, poorly drained, sandy soils that have a loamy subsoil or sandy substratum over limestone bedrock

This map unit consists of a large mapped area and several smaller areas. The large area is about 30 miles long and 15 miles wide at its widest point. It is north of the East Tamiami Trail and south of County Roads 896 and 858, stretching from U.S. Highway 41 at the Lee County line southeast to the Fakahatchee Strand. The smaller mapped areas are to the west and north of the larger area.

This map unit consists of nearly level, poorly drained soils in sloughs and on flatwoods. The natural vegetation on the sloughs consists of scattered areas of South Florida slash pine, scrub cypress, cabbage palm, sand cordgrass, panicum, and chalky bluestem. The natural vegetation on the flatwoods is saw palmetto, scattered areas of South Florida slash pine, waxmyrtle, threeawn, and cabbage palm.

This map unit makes up about 152,307 acres, or about 22.3 percent of the survey area. It consists of about 41 percent Pineda soils and the similar Riviera soils, 28 percent Boca soils, 24 percent Hallandale soils, and 7 percent soils of minor extent.

Pineda soils are poorly drained. Typically, the surface layer is dark grayish brown fine sand about 4 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 12 inches. The subsoil extends to a depth of about 55 inches. The upper part of the subsoil is brownish yellow and very pale brown fine sand, the next part is grayish brown sandy clay loam, and the lower part is light brownish gray and dark grayish brown fine sandy loam. Limestone bedrock is at a depth of about 55 inches.

Boca soils are poorly drained. Typically, the surface

layer is very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper part of the subsurface layer is light gray, and the lower part is brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

Hallandale soils are poorly drained. Typically, the surface layer is very dark gray fine sand about 3 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 9 inches. The subsoil is yellowish brown fine sand to a depth of about 12 inches. Limestone bedrock is at a depth of about 12 inches.

The soils of minor extent in this unit are Copeland, Malabar, Basinger, Jupiter, Margate, and Ochopee soils.

The soils in this map unit are used for a variety of purposes, including urban development and agriculture. Some areas have been left in natural vegetation.

Soils of Prairies, Swamps, and Freshwater Marshes

The three general soil map units in this group consist of nearly level, poorly drained and very poorly drained soils. Some of the soils are shallow to moderately deep, loamy soils overlying limestone bedrock; some are sandy, have a loamy subsoil, and have bedrock at a depth of 24 to 60 inches; and some have a sandy surface layer, a loamy subsurface layer, and limestone bedrock at a depth of more than 60 inches.

6. Boca-Riviera-Copeland

Level, very poorly drained, sandy soils that have a loamy subsoil over limestone bedrock

This map unit consists of one large mapped area and several smaller mapped areas throughout the survey area. The largest mapped area is 1 to 6 miles wide and 28 miles long. It includes the Fakahatchee Strand and adjacent cypress strands near the eastern boundary of the survey area from U.S. Highway 41 near Copeland to County Road 846, just southwest of Immokalee. Another large area, about 10 miles long and 5 miles wide, is southwest of Corkscrew Marsh, along the Collier County's northwest border with Lee County.

This map unit consists of very poorly drained soils in cypress strands. The natural vegetation in the cypress strands is baldcypress, pickerelweed, maidencane, sawgrass, and Florida willow.

This map unit makes up about 108,070 acres, or about 15.8 percent of the survey area. It is about 30 percent Boca soils, 30 percent Riviera soils, 30 percent Copeland soils, and 10 percent soils of minor extent.

Boca soils are very poorly drained. Typically, the surface layer is very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper part of the subsurface layer is light gray, and the lower part is brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

Riviera soils are very poorly drained. Typically, the surface layer is gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 32 inches. The upper part of the subsurface layer is light brownish gray, and the lower part is light gray. The subsoil is sandy clay loam to a depth of about 54 inches. The upper part of the subsoil is grayish brown, and the lower part is dark gray. Limestone bedrock is at a depth of about 54 inches.

Copeland soils are very poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 18 inches. The upper part of the subsurface layer is very dark grayish brown, and the lower part is dark gray. The subsoil is light gray, mottled sandy clay loam to a depth of about 24 inches. The substratum is light gray marl to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

The soils of minor extent in this unit are Basinger, Gator, Hallandale, Jupiter, and Dania soils.

Most areas of this unit were used for logging during the middle of the 20th century. Since that time, however, they have been left undisturbed as wildlife and botanical preserves.

7. Ochopee-Pennsuco

Poorly drained, loamy soils that have a loamy subsoil over limestone bedrock

This map unit consists of 5 large mapped areas and several smaller areas in the south-central part of the survey area. The largest unit is 8 miles long and about 3 miles wide, and it is between the Big Cypress Preserve and the Fakahatchee Strand. Other large areas of this unit are along the western, southeastern, and southwestern edges of the Fakahatchee Strand.

This unit consists of nearly level, poorly drained soils in low prairies and wetland hardwood areas. The natural vegetation in the prairies is sawgrass, reeds, maidencane, needlegrass, sedges, waxmyrtle, scattered areas of dwarf cypress, rushes, and cordgrass. The natural vegetation in the hardwood swamps is red maple, scrub cypress, saw palmetto, and South Florida slash pine.

This map unit makes up about 40,512 acres, or about 5.9 percent of the survey area. It is about 81 percent Ochopee soils and 19 percent Pennsuco soils.

Ochopee soils are poorly drained. Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer is dark gray fine sandy loam to a depth of about 17 inches. Limestone bedrock is at a depth of about 17 inches.

Pennsuco soils are poorly drained. Typically, the surface layer is very dark gray silt loam about 5 inches thick. The subsoil is dark gray silt loam to a depth of about 40 inches. The substratum is grayish brown fine sand to a depth of about 48 inches. Limestone bedrock is at a depth of about 48 inches.

Most of areas of this map unit have been left in natural vegetation. A few areas have been cleared and prepared for urban development.

8. Winder-Riviera-Chobee

Level, very poorly drained, sandy over loamy soils with sandy and loamy soils with a loamy subsoil

This map unit consists of two mapped areas. The larger area is 18 miles long and 1 to 6 miles wide. It is in the extreme eastern part of the survey area, stretching from the Hendry County line to the northern border of the Big Cypress Preserve. The second area is about 10 miles long and 1 to 3 miles wide. It is in the Corkscrew Marsh in the northwestern corner of Collier County and has a divergent extension stretching about 5 miles south of Lake Trafford.

This map unit consists of level, very poorly drained soils in freshwater marshes. The natural vegetation consists of sawgrass, maidencane, pickerelweed, fireflag, and Florida willow.

This map unit makes up about 30,167 acres, or about 4.4 percent of the survey area. It is about 35 percent Winder soils, 30 percent Riviera soils, 25 percent Chobee soils, and 10 percent soils of minor extent.

Winder soils are very poorly drained. Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 50 inches. The upper part of the subsoil is gray fine sandy loam, the next part is gray sandy clay loam, and the lower part is dark gray sandy clay loam. The substratum is white fine sandy loam to a depth of about 80 inches.

Riviera soils are very poorly drained. Typically, the surface layer is gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 32 inches. The upper part of the subsurface layer is light brownish gray, and the lower part is light gray. The subsoil is sandy clay loam to a depth of about 54 inches. The upper part of the subsoil is grayish brown, and the lower part is dark gray. Limestone bedrock is at a depth of about 54 inches.

Chobee soils are very poorly drained. Typically, the surface layer is fine sandy loam about 13 inches thick. The subsoil is sandy clay loam to a depth of about 47 inches. The upper part of the subsoil is dark gray, and the lower part is gray. The substratum is dark greenish gray and gray fine sandy loam and loamy fine sand to a depth of about 80 inches.

The soils of minor extent in this unit are Boca, Gator, and Pineda soils.

Most areas of this freshwater marsh unit have been left in natural vegetation and are used as wildlife management areas.

Soils of the Tidal Areas

The two general soil map units in this group consist of nearly level, very poorly drained and moderately well drained soils in the tidal swamps and marshes and associated sandy and shelly beach deposits. Some of the soils are organic to a depth of 20 to more than 80 inches; some are sandy throughout and often have a thin mucky surface; some are mixed fine sand and shells to a depth of 80 inches or more.

9. Durbin-Wulfert-Canaveral

Nearly level, very poorly drained and moderately well drained, mucky or sandy soils that have a sandy substratum

This map unit occurs entirely along the coastal margin of Collier County. It is about 20 miles wide at its widest point, and it is between U.S. Highway 41 at Collier-Seminole State Park and Cape Romano.

This map unit consists mainly of nearly level, very poorly drained tidal areas and low, narrow, moderately well drained ridges along the Gulf of Mexico. The natural vegetation in the tidal areas is dominantly mangroves. The natural vegetation on the ridges consists of Australian pines, cabbage palms, coconut palms, seagrapes, and various grasses and shrubs.

This map unit makes up about 69,871 acres, or about 10.2 percent of the survey area. It is about 54 percent Durbin soils, 44 percent Wulfert soils, and 2 percent Canaveral soils.

Durbin soils are very poorly drained. Typically, the surface soil is dark reddish brown to black muck about 63 inches thick. The substratum is dark gray fine sand to a depth of about 80 inches.

Wulfert soils are very poorly drained. Typically, the surface soil is dark reddish brown to black muck about 40 inches thick. The substratum is dark gray fine sand to a depth of about 80 inches.

Canaveral soils are moderately well drained. Typically, the surface layer is dark brown fine sand about 4 inches thick. The substratum is brown to light gray fine sand that is mixed with shell fragments to a depth of about 80 inches.

The soils of minor extent in this map unit are Beaches. Beaches make up a small part of this map unit along the extreme edges of the land area. Also included are small

Figure 3.—An area of the Kesson-Estero-Peckish general soil map unit. Cordgrass and needlerush are the dominant species in these frequently flooded marshes.

areas of very poorly drained soils that consist of mixed shells and organic material.

Most areas of this unit remain in natural vegetation. Some areas, particularly along the coast, have been altered for use as sites for homes or for other purposes.

10. Kesson-Estero-Peckish

Level, very poorly drained sandy soils with muck or mucky fine sand soils with a sandy substratum; some have an organically coated subsoil

This map unit consists of a nearly continuous, narrow strip between the uplands and mangrove swamps in the southern part of Collier County. It is about 3 miles wide at its widest point, and it is south of the Fakahatchee Strand.

This map unit consists of level, very poorly drained soils in tidal marshes along the Gulf Coast mangrove swamps. The natural vegetation in these marshes is cordgrass, black needlerush, scattered areas of mangroves, and batis (fig. 3). Cattails are common along the ditches that discharge freshwater into the marshes from the interior of the county.

This map unit makes up about 11,717 acres, or about 1.7 percent of the survey area. It is about 52 percent Kesson soils, 20 percent Peckish soils, 20 percent Estero

soils, and 8 percent soils of minor extent.

Kesson soils are very poorly drained. Typically, the surface layer is black muck about 5 inches thick. The subsurface layer is dark gray fine sand to a depth of about 10 inches. The substratum is fine sand to a depth of about 80 inches. The upper part of the substratum is gray, the next part is light brownish gray, and the lower part is pale brown.

Estero soils are very poorly drained. Typically, the surface layer is black muck about 6 inches thick. The subsurface layer is fine sand to a depth of about 40 inches. The upper part of the subsurface layer is black, and the lower part is dark grayish brown. The subsoil is dark brown and very dark brown fine sand to a depth of about 62 inches.

Peckish soils are very poorly drained. Typically, the surface layer is very dark grayish brown mucky fine sand about 9 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 37 inches. The subsoil is dark brown fine sand to a depth of about 42 inches. The substratum is light brownish gray fine sand to a depth of about 80 inches.

Of minor extent in this unit are Basinger, occasionally flooded, soils.

Almost all areas of this map unit remain in natural vegetation.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Boca fine sand is a phase of the Boca series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Urban land-Satellite complex is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Pineda and Riviera fine sands is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

2—Holopaw fine sand, limestone substratum

This nearly level, poorly drained soil is in sloughs and broad, poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 20 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 57 inches. The upper part of the subsurface layer is white, and the lower part is light gray and dark grayish brown. The subsoil extends to a depth of about 62 inches. It is dark grayish brown fine sandy loam. Limestone bedrock is at a depth of about 62 inches.

In 95 percent of the areas mapped as Holopaw fine sand, limestone substratum, Holopaw and similar soils make up 78 to 97 percent of the map unit. In the remaining areas, the Holopaw soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Malabar, Pineda, and Riviera soils that have a limestone substratum are similar to those of the Holopaw soil.

The dissimilar soils in this map unit are small areas of Basinger, Boca, and Chobee soils in landscape positions similar to those of the Holopaw soil. These soils make up about 3 to 22 percent of the unit.

The permeability of this soil is moderate to moderately slow. The available water capacity is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of scattered areas of South Florida slash pine, cypress, cabbage palm, saw palmetto, waxmyrtle, sand cordgrass, chalky bluestem, and gulf muhly.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is well suited to range. The dominant forage consists of blue maidencane, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. The Holopaw soil is in the Slough range site.

This soil has severe limitations for most urban uses because of the high water table. It has severe limitations for septic tank absorption fields because of the wetness, poor filtration, and the slow percolation rate. Building sites and septic tank absorption fields should be mounded to overcome these limitations. This soil also has severe limitations for recreational development because of wetness and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

This Holopaw soil is in capability subclass IVw.

3—Malabar fine sand

This nearly level, poorly drained soil is in sloughs and poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 10 to 250 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 2 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 72 inches. The upper part of the subsoil is brownish yellow and yellow fine sand, the next part is very pale brown and light gray fine sand, and the lower part is grayish brown, mottled sandy clay loam. The substratum is light gray fine sand that has 10 percent shell fragments to a depth of about 80 inches.

In 95 percent of the areas mapped as Malabar fine sand, Malabar and similar soils make up 75 to 99 percent of the map unit. In the remaining areas, the Malabar soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Pineda and Riviera soils are similar to those of the Malabar soil.

The dissimilar soils in this map unit are small areas of Basinger, Boca, and Oldsmar soils in landscape positions similar to those of the Malabar soil. These soils make up about 1 to 25 percent of the unit.

The permeability of this soil is slow or very slow. The available water capacity is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. In the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of scattered areas of South Florida slash pine, cypress, cabbage palm, saw palmetto, waxmyrtle, pineland threeawn, and chalky bluestem.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry

seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is well suited to range. The dominant forage consists of blue maidencane, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. The Malabar soil is in the Slough range site.

This soil has severe limitations for most urban uses because of the high water table. It has severe limitations for septic tank absorption fields because of wetness and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. This soil also has severe limitations for recreational development because of wetness and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

This Malabar soil is in capability subclass IVw.

4—Chobee, limestone substratum, and Dania mucks, depressional

These level, very poorly drained soils are in cypress swamps and marshes. Individual areas are elongated and irregular in shape, and they range from 10 to 100 acres in size. The slope is 0 to 1 percent.

Typically, the surface layer of the Chobee soil is black fine sandy loam to a depth of about 6 inches. The subsurface layer is black fine sandy loam to a depth of about 13 inches. The subsoil is mottled sandy clay loam to a depth of about 45 inches. The upper part of the subsoil is dark gray, and the lower part is gray. Limestone bedrock is at a depth of about 45 inches.

Typically, the surface layer of the Dania soil is black muck about 10 inches thick. The substratum is light gray loamy fine sand to a depth of about 12 inches. Limestone bedrock is at a depth of about 12 inches.

Mapped areas can consist entirely of the Chobee soil, entirely of the Dania soil, or any combination of the two soils. The two soils were not separated in mapping because of similar management needs resulting from the ponding.

The dissimilar soils in this map unit are small areas of Gator and Hallandale soils in similar landscape positions. These soils make up about 5 to 15 percent of the unit.

The permeability in the Chobee soil is moderate, and the available water capacity is moderate. The permeability in the Dania soil is rapid, and the available water capacity is very low. Under natural conditions, these soils are ponded for 6 months or more during most years. During the other months, the water table is within a depth of 12 inches, and it recedes to a depth of 12 to 40 inches during extended dry periods.

These soils are not suited to cultivated crops or citrus because of ponding and wetness. They are used for natural wetlands. The natural vegetation consists of cypress, red maple, ferns, maidencane, and other wetland plants.

These soils are moderately suited to range. The dominant forage is maidencane. Since the depth of the water table fluctuates throughout the year, a natural deferment from cattle grazing occurs. Although this rest period increases forage production, the periods of high water may reduce the grazing value of the site. The Chobee and Dania soils are in the Freshwater Marshes and Ponds range site.

These soils have severe limitations for all urban and recreational uses because of ponding and the depth to bedrock. They also have severe limitations for septic tank absorption fields because of ponding, the depth to bedrock, slow percolation, and poor filtration. An effective drainage system that keeps the water table at a given depth is expensive and difficult to establish and maintain. Also, these soils act as a collecting basin for the area; therefore, a suitable outlet to remove the water is not available. They require an adequate amount of fill material to maintain house foundations and road beds above the high water table. Even when a good drainage system is installed and the proper amount of fill material is added, keeping the area dry is a continual problem because of seepage water from the slightly higher adjacent sloughs or flatwoods.

The Chobee and Dania soils are in capability subclass VIIw.

6—Riviera, limestone substratum-Copeland fine sands

These nearly level, poorly drained soils are in sloughs and cypress swamps. Individual areas are elongated and irregular in shape, and they range from 40 to 400 acres in size. The slope is 0 to 2 percent.

Typically, the Riviera soil has a surface layer of gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 32 inches. The upper part of the subsurface layer is light brownish gray, and the lower part is light gray. The subsoil is sandy clay loam to a depth of about 54 inches. The upper part of the subsoil is grayish brown, and the lower part is dark gray. Limestone bedrock is at a depth of about 54 inches.

Typically, the Copeland soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 18 inches. The upper part of the subsurface layer is very dark grayish brown, and the lower part is dark gray. The subsoil is light gray, mottled sandy clay loam to a depth about 24 inches. The substratum is light gray marl to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

In 90 percent of the areas mapped as Riviera, limestone substratum-Copeland fine sands, Riviera and similar soils make up 55 to 75 percent of the map unit and Copeland and similar soils make up 25 to 40 percent. In the remaining areas, the named soils make up either a higher or lower percentage of the mapped areas. The two soils occur as areas so intricately mixed or so small that mapping them separately was not practical. The characteristics of Holopaw and Pineda soils are similar to those of the major soils.

The dissimilar soils in this map unit are small areas of Boca soils in similar landscape positions. These soils make up about 1 to 10 percent of the unit.

The permeability in the Riviera soil is moderately rapid to moderately slow, and the available water capacity is low. The permeability in the Copeland soil is moderate, and the available water capacity is moderate. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soils are covered by shallow, slowly moving water for about 7 days.

These soils are presently used for natural wetlands. The natural vegetation consists of cypress, red maple, ferns, and other wetland plants.

These soils are poorly suited to cultivated crops because of the wetness and droughtiness. With good water-control and soil-improving measures, these soils are suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, these soils are moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. The loamy subsoil may impede proper drainage. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, these soils are well suited to pasture. A water-control system is needed to remove excess water during the wet season. These soils are well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

These soils are poorly suited to range. The Riviera and Copeland soils have not been assigned to a range site.

These soils have severe limitations for most urban uses because of the high water table. They have severe limitations for septic tank absorption fields because of wetness, slow percolation, and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. These soils also have severe limitations for recreational development because of wetness and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

The Riviera and Copeland soils are in capability subclass IIIw.

7—Immokalee fine sand

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 10 to 500 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is light gray fine sand to a depth of about 35 inches. The subsoil is fine sand to a depth of about 58 inches. The upper part of the subsoil is

Figure 4.—An area of Immokalee fine sand. The dominant vegetation in areas of this map unit includes South Florida slash pine, saw palmetto, and several species of threeawns.

black, the next part is dark reddish brown, and the lower part is dark brown. The substratum is pale brown fine sand to a depth of about 80 inches.

In 95 percent of the areas mapped as Immokalee fine sand, Immokalee and similar soils make up 89 to 99 percent of the map unit. In the remaining areas, the Immokalee soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Myakka and Oldsmar soils are similar to those of the Immokalee soil.

The dissimilar soils in this map unit are small areas of Basinger and Holopaw soils in sloughs. These soils make up about 1 to 11 percent of the unit.

The permeability of this soil is moderate. The available water capacity is low. Under natural conditions, the seasonal high water table is at a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists of South Florida slash pine, saw palmetto (fig. 4), waxmyrtle, chalky bluestem,

creeping bluestem, and pineland threeawn.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. This Immokalee soil is in the South Florida Flatwoods range site.

This soil has severe limitations for most urban uses and septic tank absorption fields because of the wetness. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of wetness and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of these limitations can be overcome.

This Immokalee soil is in capability subclass IVw.

8—Myakka fine sand

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 10 to 400 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 7 inches thick. The subsurface layer is fine sand to a depth of about 27 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil is fine sand to a depth of about 48 inches. The upper part of the subsoil is black, and the lower part is brown. The substratum is yellowish brown fine sand to a depth of about 80 inches.

In 80 percent of the areas mapped as Myakka fine sand, Myakka and similar soils make up 95 to 98 percent of the map unit. In the remaining areas, the Myakka soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Immokalee soils are similar to those of the Myakka soil.

The permeability of this soil is moderate. The available water capacity is low. Under natural conditions, the seasonal high water table is at a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists mostly of South Florida slash pine, saw palmetto, waxmyrtle, chalky bluestem, creeping bluestem, and pineland threeawn.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing

and brush control. This Myakka soil is in the South Florida Flatwoods range site.

This soil has severe limitations for most urban uses because of the wetness. It has severe limitations for septic tank absorption fields because of the wetness. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of wetness and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of these limitations can be overcome.

This Myakka soil is in capability subclass IVw.

10—Oldsmar fine sand, limestone substratum

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 10 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 35 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 60 inches. The upper part of the subsoil is black fine sand, the next part is very dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. Limestone bedrock is at a depth of about 60 inches.

In 95 percent of the areas mapped as Oldsmar fine sand, limestone substratum, Oldsmar and similar soils make up 85 to 98 percent of the map unit. In the remaining areas, the Oldsmar soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Immokalee and Wabasso soils are similar to those of the Oldsmar soil.

The dissimilar soils in this map unit are small areas of Malabar, Pineda, and Riviera soils in sloughs. These soils make up about 0 to 15 percent of the map unit.

The permeability of this soil is slow. The available water capacity is low. Under natural conditions, the seasonal high water table is between a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists mostly of cabbage palm, South Florida slash pine, saw palmetto, waxmyrtle, and chalky bluestem.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. This Oldsmar soil is in the South Florida Flatwoods range site.

This soil has severe limitations for most urban uses because of wetness. It has severe limitations for septic tank absorption fields because of the wetness, slow percolation rate, and poor filtration. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of wetness and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of these limitations can be overcome.

This Oldsmar soil is in capability subclass IVw.

11—Hallandale fine sand

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 20 to 1,000 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 3 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 9 inches. The subsoil is yellowish brown fine sand to a depth of about 12 inches. Limestone bedrock is at a depth of about 12 inches.

In 95 percent of the areas mapped as Hallandale fine sand, Hallandale and similar soils make up 83 to 98 percent of the map unit. In the remaining areas, the Hallandale soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Boca and Jupiter soils are similar to those of the Hallandale soil.

The dissimilar soils in this map unit are small areas of Pineda and Riviera, limestone substratum, soils in sloughs. These soils make up about 17 percent or less of the unit.

The permeability of this soil is rapid. The available water capacity is very low. Under natural conditions, the seasonal high water table is between a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists of South Florida slash pine, saw palmetto, creeping bluestem, chalky bluestem, and pineland threeawn.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. This Hallandale soil is in the South Florida Flatwoods range site.

This soil has severe limitations for most urban uses because of the shallow depth to bedrock and the wetness. It has severe limitations for septic tank absorption fields because of the depth to bedrock, wetness, and poor filtration. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil has severe limitations because of wetness, the sandy texture, and the shallow depth to bedrock; however, with proper drainage to remove excess surface water during wet periods, some of these limitations can be overcome.

This Hallandale soil is in capability subclass IVw.

14—Pineda fine sand, limestone substratum

This nearly level, poorly drained soil is in sloughs and poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 20 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sand about 4 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 12 inches. The subsoil extends to a depth of about 55 inches. The upper part of the subsoil is brownish yellow and very pale brown fine sand, the next part is grayish brown sandy clay loam, and the lower part is light brownish gray and dark grayish brown fine sandy loam. Limestone bedrock is at a depth of about 55 inches.

In 95 percent of the areas mapped as Pineda fine sand, limestone substratum, Pineda and similar soils make up 79 to 98 percent of the map unit. In the remaining areas, the Pineda soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Holopaw and Riviera, limestone substratum, soils are similar to those of the Pineda soil.

The dissimilar soils in this map unit are small areas of Boca, Hallandale, and Malabar soils in landscape positions similar to those of the Pineda soil. These soils make up about 11 percent of less of the unit.

The permeability of this soil is slow. The available water capacity is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of South Florida slash pine, waxmyrtle, chalky bluestem, blue maidencane, and gulf muhly.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is well suited to range. The dominant forage consists of blue maidencane, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. This soil is in the Slough range site.

This soil has severe limitations for most urban uses because of the high water table. It has severe limitations for septic tank absorption fields because of the wetness, slow percolation, and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. This soil also has severe limitations for recreational development because of wetness and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

This Pineda soil is in capability subclass IIIw.

15—Pomello fine sand

This nearly level, moderately well drained soil is on low ridges on flatwoods. Individual areas are elongated and irregular in shape, and they range from 5 to 100 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 35 inches. The upper part of the subsurface layer is light gray, and the lower part is white. The subsoil is fine sand to a depth of about 60 inches. The upper part of the subsoil is black, the next part is dark brown, and the lower part is brown. The substratum is light yellowish brown to brown fine sand to a depth of about 80 inches.

In 95 percent of the areas mapped as Pomello fine sand, Pomello and similar soils make up 85 to 98 percent of the map unit. In the remaining areas, the Pomello soil makes up either a higher or lower percentage of the mapped areas.

The permeability of this soil is moderately rapid. The available water capacity is low. Under natural conditions, the seasonal high water table is at a depth of 24 to 42 inches for 1 to 5 months during most years. During the other months, the water table is below a depth of 40 inches, and it recedes to a depth of more than 80 inches during extended dry periods.

The natural vegetation consists mostly of oak, South Florida slash pine, saw palmetto, cactus, chalky bluestem, creeping bluestem, and pineland threeawn.

This soil is poorly suited to cultivated crops because of the droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With irrigation and soil-improving measures, this soil is suitable for many fruit and vegetable crops. Row crops should be rotated with cover crops. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

This soil is moderately suited to pasture. Pangolagrass and bahiagrass are adapted species, but they produce fair yields with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is poorly suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. The dense growth of scrubby oaks, saw palmetto, and other shrubs dominates the desirable forage. Management practices should include deferred grazing and brush control. Livestock usually do not use this range site, except for protection and as dry bedding ground during the wet seasons. This Pomello soil is in the Sand Pine Scrub Range site.

This soil has moderate limitations for most urban uses because of the wetness and droughtiness. It has severe limitations for septic tank absorption fields because of wetness and the poor filtration. If this soil is used as a

septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of droughtiness and the sandy texture. Suitable topsoil or other material should be added to improve trafficability.

This Pomello soil is in capability subclass VIs.

16—Oldsmar fine sand

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 20 to 450 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 35 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 80 inches. The upper part of the subsoil is black fine sand, the next part is very dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam.

In 95 percent of the areas mapped as Oldsmar fine sand, Oldsmar and similar soils make up 80 to 98 percent of the map unit. In the remaining areas, the Oldsmar soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Immokalee soils are similar to those of the Oldsmar soil.

The dissimilar soils in this map unit are small areas of Malabar and Pineda soils in sloughs. These soils make up about 20 percent or less of the unit.

The permeability of this soil is slow or very slow. The available water capacity is low. Natural fertility also is low. Under natural conditions, the seasonal high water table is between a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists mostly of South Florida slash pine, cabbage palm, saw palmetto, waxmyrtle, chalky bluestem, and pineland threeawn.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. This Oldsmar soil is in the South Florida Flatwoods range site.

This soil has severe limitations for most urban uses because of wetness. It has severe limitations for septic tank absorption fields because of wetness and slow percolation. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of wetness, slow percolation, and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of these limitations can be overcome.

This Oldsmar soil is in capability subclass IVw.

17—Basinger fine sand

This nearly level, poorly drained soil is in sloughs and poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 20 to 800 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is grayish brown fine sand about 3 inches thick. The subsurface layer is light gray fine sand to a depth of about 25 inches. The subsoil is brown fine sand to a depth of about 44 inches. The substratum is brown fine sand to a depth of about 80 inches.

In 95 percent of the areas mapped as Basinger fine sand, Basinger and similar soils make up 83 to 98 percent of the map unit. In the remaining areas, the Basinger soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Malabar soils are similar to those of the Basinger soil.

The dissimilar soils in this map unit are small areas of Immokalee soils on flatwoods. These soils make up 17 percent or less of the map unit.

The permeability of this soil is rapid. The available water capacity is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of scattered areas of South Florida slash pine, cypress, cabbage palm, saw palmetto, waxmyrtle, blue maidencane, sand cordgrass, pineland threeawn, chalky bluestem, and St. Johnswort.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Because of the rapid permeability, the water table is difficult to maintain. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is well suited to range. The dominant forage consists of blue maidencane, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. This Basinger soil is in the Slough range site.

This soil has severe limitations for most urban uses because of the high water table. It has severe limitations for septic tank absorption fields because of wetness and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. This soil also has severe limitations for recreational development because of wetness and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

This Basinger soil is in capability subclass IVw.

18—Riviera fine sand, limestone substratum

This nearly level, poorly drained soil is in sloughs and broad, poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 25 to 500 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 32 inches. The upper part of the subsurface layer is light brownish gray, and the lower part is light gray. The subsoil is sandy clay loam to a depth of about 54 inches. The upper part of the subsoil is grayish brown, and the lower part is dark gray. Limestone bedrock is at a depth of about 54 inches.

In 95 percent of the areas mapped as Riviera fine sand, limestone substratum, Riviera and similar soils make up 80 to 96 percent of the map unit. In the remaining areas, the named soil or soils make up either a higher or lower percentage of the mapped areas. The characteristics of Pineda soils that have a limestone substratum are similar to those of the Riviera soil.

The dissimilar soils in this map unit are small areas of Boca, Copeland, and Holopaw soils in landscape positions similar to those of the Riviera soil. These soils make up about 4 to 20 percent of the unit.

The permeability of this soil is moderate to moderately rapid. The available water capacity is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of scattered areas of South Florida slash pine, cypress, cabbage palm, waxmyrtle, sand cordgrass, gulf muhly, blue maidencane, South Florida bluestem, and chalky bluestem.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. With good water-control and soil-improving measures, the soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows.

Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is well suited to range. The dominant forage consists of blue maidencane, chalky bluestem, bluejoint panicum, South Florida bluestem, and gulf dune paspalum. Management practices should include deferred grazing. This Riviera soil is in the Slough range site.

This soil has severe limitations for most urban uses because of the high water table. It has severe limitations for septic tank absorption fields because of wetness and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. This soil also has severe limitations for recreational development because of wetness and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

This Riviera soil is in capability subclass IIIw.

20—Ft. Drum and Malabar, high, fine sands

These nearly level, poorly drained soils are on ridges along sloughs. Individual areas are elongated and irregular in shape, and they range from 10 to 200 acres in size. The slope is 0 to 2 percent.

Typically, the Ft. Drum soil has a surface layer of very dark grayish brown fine sand about 5 inches thick. The subsoil is fine sand to a depth of about 20 inches. The upper part of the subsoil is light brownish gray, and the lower part is light gray. The substratum is fine sand to a depth of about 80 inches. The upper part of the substratum is brownish yellow, the next part is white, and the lower part is brown.

Typically, the Malabar, high, soil has a surface layer of dark gray fine sand about 2 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 72 inches. The upper part of the subsoil is brownish yellow and yellow fine sand, the next part is very pale brown and light gray fine sand, and the lower part is grayish brown, mottled sandy clay loam. The substratum is light gray fine sand to a depth of about 80 inches.

Mapped areas can consist entirely of the Ft. Drum soil, entirely of the Malabar soil, or any combination of the two soils. The two soils were not separated in mapping because of similar management needs and soil characteristics.

The dissimilar soils in this map unit are small areas of Basinger, Holopaw, and Pineda soils in sloughs. These soils make up about 0 to 18 percent of the unit.

The permeability in the Ft. Drum soil is rapid. The permeability in the Malabar soil is slow or very slow. The available water capacity of both soils is low. Under natural conditions, the seasonal high water table is at a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists mostly of South Florida slash pine, saw palmetto, live oak, cabbage palm, waxmyrtle, chalky bluestem, creeping bluestem, low panicum, and pineland threeawn.

These soils are poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, these soils are suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, these soils are well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soils from blowing when the trees are younger.

With good water-control management, these soils are well suited to pasture. A water-control system is needed to remove excess water during the wet season. These soils are well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

These soils are moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. The Ft. Drum and Malabar soils are in the Cabbage Palm Flatwoods range site.

These soils have severe limitations for most urban uses because of the wetness. They have severe limitations for septic tank absorption fields because of the wetness and poor filtration. If these soils are used as a septic tank absorption field, they should be mounded to maintain the system well above the seasonal high water table. For recreational uses, these soils also have severe limitations because of wetness and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of these limitations can be overcome.

The Ft. Drum and Malabar soils are in capability subclass IVw.

21—Boca fine sand

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 20 to 350 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper part of the subsurface layer is light gray, and the lower part is brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

In 95 percent of the areas mapped as Boca fine sand, Boca and similar soils make up 79 to 93 percent of the map unit. In the remaining areas, the Boca soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Hallandale soils are similar to those of the Boca soil.

The dissimilar soils in this map unit are small areas of Pineda and Riviera, limestone substratum, soils in sloughs. These soils make up about 7 to 21 percent of the unit.

The permeability of this soil is moderate. The available water capacity is very low. Under natural conditions, the seasonal high water table is at a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists mostly of South Florida slash pine, cabbage palm, saw palmetto, waxmyrtle, chalky bluestem, and pineland threeawn.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With proper water management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. This Boca soil is in the South Florida Flatwood range site.

This soil has severe limitations for most urban uses because of the depth to bedrock and wetness. It has severe limitations for septic tank absorption fields because of the shallow depth to bedrock, wetness, and poor filtration. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of wetness and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of these limitations can be overcome.

This Boca soil is in capability subclass IIIw.

22—Chobee, Winder, and Gator soils, depressional

These level, very poorly drained soils are in depressions and marshes. Individual areas are circular or elongated in shape, and they range from 5 to 200 acres in size. The slope is 0 to 1 percent.

Typically, the Chobee soil has a surface layer of black fine sandy loam about 13 inches thick. The subsoil is mottled sandy clay loam to a depth of about 47 inches. The upper part of the subsoil is dark gray, and the lower part is gray. The substratum is dark greenish gray and gray fine sandy loam to a depth of about 80 inches.

Typically, the Winder soil has a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 50 inches. The upper part of the subsoil is gray fine sandy loam, the next part is gray sandy clay loam, and the lower part is dark gray sandy clay loam. The substratum is white fine sandy loam to a depth of about 80 inches.

Typically, the Gator soil has a surface soil of black muck about 25 inches thick. The substratum is very dark gray, grayish brown, greenish gray, and light gray fine sandy loam to a depth of about 80 inches.

Mapped areas can consist entirely of the Chobee soil, entirely of the Winder soil, entirely of the Gator soil, or any combination of the three soils. The three soils were not separated in mapping because of similar management needs resulting from the ponding.

The dissimilar soils in this map unit are small areas of Pineda and Riviera soils in similar landscape positions. These soils make up about 17 percent or less of the unit.

The permeability in these soils is slow or very slow. The available water capacity is moderate in the Chobee and Winder soils and high in the Gator soil. Under natural conditions, these soils are ponded for 6 months or more each year during most years. During the other months, the water table is within a depth of 12 inches, and it recedes to a depth of 12 to 40 inches during extended dry periods.

These soils are not suited to cultivated crops or citrus because of flooding, ponding, and wetness. These soils are used for natural wetlands. The natural vegetation consists of pickerelweed, maidencane, rushes, fireflag, sawgrass, Florida willow, and a few cypress trees.

These soils are moderately suited to range. The dominant forage consists of maidencane and cutgrass. Since the depth of the water table fluctuates throughout the year, a natural deferment from cattle grazing occurs. Although this rest period increases forage production, the periods of high water may reduce the grazing value of the site. The Chobee, Winder, and Gator soils are in the Freshwater Marshes and Ponds range site.

These soils have severe limitations for all urban and recreational uses because of ponding. They have severe limitations for septic tank absorption fields because of ponding, slow percolation, and poor filtration. An effective drainage system that keeps the water table at a given depth is expensive and difficult to establish and maintain. Also, these soils act as a collecting basin for the area; therefore, a suitable outlet to remove the water is not available. They require an adequate amount of fill material to maintain house foundations and road beds above the high water table. Muck should be removed before adding fill material. Even when a good drainage system is installed and the proper amount of fill material is added, keeping the area dry is a continual problem because of seepage water from the slightly higher adjacent sloughs and flatwoods.

The Chobee, Winder, and Gator soils are in capability subclass VIIw.

23—Holopaw and Okeelanta soils, depressional

These level, very poorly drained soils are in depressions and marshes. Individual areas are circular or elongated in shape, and they range from 5 to 200 acres in size. The slope is 0 to 1 percent.

Typically, the Holopaw soil has a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 52 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 62 inches. The upper part of the subsoil is dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. The substratum is gray loamy fine sand to a depth of about 80 inches.

Typically, the Okeelanta soil has surface soil of black and dark reddish brown muck about 20 inches thick. The substratum extends to a depth of about 80 inches. The upper part of the substratum is dark grayish brown fine sand, and the lower part is light brownish gray loamy fine sand.

Mapped areas can consist entirely of the Holopaw soil, entirely of the Okeelanta soil, or any combination of the two soils. The two soils were not separated in mapping because of similar management needs resulting from the ponding. The characteristics of Riviera soils are similar to those of the major soils.

The dissimilar soils in this map unit are small areas of Basinger and Gator soils in similar landscape positions. These soils make up about 10 percent or less of the unit.

The permeability in the Holopaw soil is moderate to moderately slow, and the available water capacity is low. The permeability in the Okeelanta soil is slow or very slow, and the available water capacity is high. Under natural conditions, these soils are ponded for 6 months or more each year. During the other months, the water table is within a depth of 12 inches, and it recedes to a depth of 12 to 40 inches during extended dry periods.

These soils are not suited to cultivated crops or citrus because of ponding and wetness. These soils are used for natural wetlands. The natural vegetation consists of St. Johnswort, maidencane, rushes, primrose willow, fireflags,

pickerelweed, sawgrass, Florida willow, and a few cypress trees.

These soils are moderately suited to range. The dominant forage consists of maidencane and cutgrass. Since the depth of the water table fluctuates throughout the year, a natural deferment from cattle grazing occurs. Although this rest period increases forage production, the periods of high water may reduce the grazing value of the site. The Holopaw and Okeelanta soils are in the Freshwater Marshes and Ponds range site.

These soils have severe limitations for all urban and recreational uses because of ponding. An effective drainage system that keeps the water table below a given depth is needed but is difficult to establish and maintain. These soils are in landscape positions that act as a collecting basin for the area; therefore, a suitable outlet to remove the water is not available in many locations. They require an adequate amount of fill material to maintain house foundations and road beds above the high water table. Muck should be removed before adding fill material. Even when a good drainage system is installed and the proper amount of fill material is added, keeping the area dry is a continual problem because of seepage water from the slightly higher adjacent sloughs and flatwoods.

The Holopaw and Okeelanta soils are in capability subclass VIIw.

25—Boca, Riviera, limestone substratum, and Copeland fine sands, depressional

These level, very poorly drained soils are in depressions, cypress swamps, and marshes. Individual areas are elongated and irregular in shape, and they range from 100 to 3,000 acres in size. The slope is 0 to 1 percent.

Typically, the Boca soil has a surface layer of very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper part of the subsurface layer is light gray, and the lower part is brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

Typically, the Riviera soil has a surface layer of gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 32 inches. The upper part of the subsurface layer is light brownish gray, and the lower part is light gray. The subsoil is sandy clay loam to a depth of about 54 inches. The upper part of the subsoil is grayish brown, and the lower part is dark gray. Limestone bedrock is at a depth of about 54 inches.

Typically, the Copeland soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 18 inches. The upper part of the subsurface layer is very dark grayish brown, and the lower part is dark gray. The subsoil is light gray, mottled sandy clay loam to a depth of about 24 inches. The substratum is light gray marl to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

Mapped areas can consist entirely of the Boca soil, entirely of the Riviera soil, entirely of the Copeland soil, or any combination of the three soils. These three soils were not separated in mapping because of similar management needs resulting from the ponding. The characteristics of Holopaw, Malabar, and Pineda soils are similar to those of the major soils.

The dissimilar soils in this map unit are small areas of Basinger, Dania, Gator, and Hallandale soils in similar landscape positions. These soils make up about 20 percent or less of the map unit.

The permeability in the Boca soil is moderate, and the available water capacity is very low. The permeability in the Riviera soil is moderately rapid to moderately slow, and the available water capacity is low. The permeability in the Copeland soil is moderately slow, and the available water capacity is moderate. Under natural conditions, these soils are ponded for 6 months or more each year. During the other months, the water table is within a depth of 12 inches, and it recedes to a depth of 12 to 40 inches during extended dry periods.

These soils are not suited to cultivated crops or citrus because of flooding, ponding, and wetness. They are used for natural wetlands. The natural vegetation consists mostly of baldcypress, pickerelweed, rushes, fireflag, sawgrass, and Florida willow.

The Boca, Riviera, and Copeland soils have not been assigned to a range site.

These soils have severe limitations for all urban and recreational uses because of ponding and the depth to bedrock. An effective drainage system that keeps the water table below a given depth is needed but is difficult to establish and maintain. These soils are in landscape positions that act as a collecting basin for the area; therefore, a suitable outlet to remove the water is often not available. They require an adequate amount of fill material to maintain house foundations and road beds above the high water table. Even when a good drainage system is installed and the proper amount of fill material is added, keeping the area dry is a continual problem because of seepage water from the slightly higher adjacent sloughs and flatwoods.

The Boca, Riviera, and Copeland soils are in capability subclass VIIw.

27—Holopaw fine sand

This nearly level, poorly drained soil is in sloughs and poorly defined drainageways. Individual areas are

elongated and irregular in shape, and they range from 10 to 400 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 52 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 62 inches. The upper part of the subsoil is dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. The substratum is gray loamy fine sand to a depth of about 80 inches.

In 90 percent of the areas mapped as Holopaw fine sand, Holopaw and similar soils make up 87 to 98 percent of the map unit. In the remaining areas, the Holopaw soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Malabar, Pineda, and Riviera soils are similar to those of the Holopaw soil.

The dissimilar soils in this map unit are small areas of Basinger and Oldsmar soils in landscape positions similar to those of the Holopaw soil. These soils make up about 13 percent or less of the unit.

The permeability of this soil is moderate to moderately slow. The available water capacity is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of scattered areas of slash pine, cypress, cabbage palm, saw palmetto, waxmyrtle, sand cordgrass, gulf muhly, panicums, chalky bluestem, plumgrass, gulf dune paspalum, and blue maidencane.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. With good water-control and soil-improving measures, the soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is well suited to range. The dominant forage consists of blue maidencane, gulf dune paspalum, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. This Holopaw soil is in the Slough range site.

This soil has severe limitations for most urban uses because of the high water table. This soil has severe limitations for septic tank absorption fields because of wetness and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. This soil also has severe limitations for recreational development because of wetness and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

This Holopaw soil is in capability subclass IVw.

28—Pineda and Riviera fine sands

These nearly level, poorly drained soils are in sloughs and poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 10 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the Pineda soil has a surface layer of dark grayish brown fine sand about 4 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 12 inches. The subsoil extends to a depth of about 55 inches. The upper part of the subsoil is brownish yellow and gray pale brown fine sand, the next part is grayish brown sandy clay loam, and the lower part is light brownish gray and dark grayish brown fine sandy loam. The substratum is light gray fine sand to a depth of about 80 inches.

Typically, the Riviera soil has a surface layer of gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 32 inches. The upper part of the subsurface layer is light brownish gray, and the lower part is light gray. The subsoil is sandy clay loam to a depth of about 54 inches. The upper part of the subsoil is grayish brown, and the lower part is dark gray. The substratum is gray fine sandy loam to a depth of about 80 inches.

Mapped areas can consist entirely of the Pineda soil, entirely of the Riviera soil, or any combination of the two soils. These two soils were not separated in mapping

because of similar soil characteristics and management needs.

The dissimilar soils in this map unit are small areas of Basinger and Boca soils in similar landscape positions. These soils make up 10 percent or less of the map unit.

The permeability of Pineda and Riviera soils is slow or very slow. The available water capacity for both soils is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soils are covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of scattered areas of slash pine, cypress, cabbage palm, saw palmetto, waxmyrtle, sand cordgrass, gulf muhly, panicums, chalky bluestem, blue maidencane, sedges, and rushes.

These soils are poorly suited to cultivated crops because of the wetness and droughtiness. With good water-control and soil-improving measures, these soils are suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, these soils are moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, these soils are well suited to pasture. A water-control system is needed to remove excess water during the wet season. They are well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

These soils are well suited to range. The dominant forage consists of blue maidencane, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. The Pineda and Riviera soils are in the Slough range site (fig. 5).

These soils have severe limitations for most urban uses because of the high water table. They have severe limitations for septic tank absorption fields because of wetness, slow percolation, and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. These soils also have severe limitations for recreational development because of wetness, slow percolation, and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

The Pineda and Riviera soils are in capability subclass IIIw.

29—Wabasso fine sand

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 10 to 100 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer is gray fine sand. The subsoil extends to a depth of about 70 inches. The upper part of the subsoil is black and very dark grayish brown fine sand; the next part is light yellowish brown and gray, mottled sandy clay loam; and the lower part is yellowish brown, mottled sandy clay loam. The substratum is light gray, mottled loamy fine sand to a depth of about 80 inches.

In 80 percent of the areas mapped as Wabasso fine sand, Wabasso and similar soils make up 80 to 98 percent of the map unit. In the remaining areas, the Wabasso soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Oldsmar soils are similar to those of the Wabasso soil.

The dissimilar soils in this map unit are small areas of Basinger, Holopaw, and Riviera soils in sloughs. These soils make up 20 percent or less of the unit.

The permeability of this soil is slow or very slow. The available water capacity is low. Under natural conditions, the seasonal high water table is at a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists mostly of South Florida slash pine, cabbage palm, saw palmetto, waxmyrtle, chalky bluestem, and pineland threeawn.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed

Figure 5.—An area of Pineda and Riviera fine sands in a slough. During the rainy season, slowly moving water covers the surface for about 7 days. The dominant vegetation includes cypress and South Florida slash pine.

preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is

well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management practices should include deferred grazing and brush control. This Wabasso soil is in the South Florida Flatwoods range site.

This soil has severe limitations for most urban uses because of wetness. This soil has severe limitations for septic tank absorption fields because of wetness, poor filtration, and slow percolation. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of wetness, slow percolation, and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of these limitations can be overcome.

This Wabasso soil is in capability subclass IIIw.

31—Hilolo, Jupiter, and Margate fine sands

These nearly level, poorly drained soils are on hammocks and flatwoods. Individual areas are elongated and irregular in shape, and they range from 5 to 600 acres in size. The slope is 0 to 2 percent.

Typically, the Hilolo soil has a surface layer of very dark grayish brown fine sand about 9 inches thick. The subsurface layer is dark grayish brown fine sand to a depth of about 12 inches. The subsoil extends to a depth of about 50 inches. The upper part of the subsoil is light brownish gray fine sandy loam, the next part is light gray sandy clay loam and fine sandy loam, and the lower part is gray fine sandy loam. The substratum is light olive gray loam fine sand to a depth of about 61 inches. Limestone bedrock is at a depth of about 61 inches.

Typically, the Jupiter soil has a surface layer of black fine sand about 4 inches thick. The subsurface layer is very dark grayish brown fine sand to a depth of about 10 inches. Limestone bedrock is at a depth of about 10 inches.

Typically, the Margate soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 17 inches. The subsoil is brown fine sand to a depth of about 35 inches. Limestone bedrock is at a depth of about 35 inches.

Mapped areas can consist entirely of the Hilolo soil, entirely of the Jupiter soil, entirely of the Margate soil, or any combination of the three soils. These three soils were not separated in mapping because of similar soil characteristics and management needs. The characteristics of Boca, Ft. Drum, and Hallandale soils are similar to those of the major soils.

The dissimilar soils in this map unit are small areas of Holopaw and Pineda soils in sloughs. These soils make up about 10 percent of the unit.

The permeability in the Hilolo soil is moderately slow to slow, and the available water capacity is moderate. The permeability in the Jupiter and Margate soils are rapid, and the available water capacity is very low. Under natural conditions, the seasonal high water table is at a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists mostly of cabbage palm, saw palmetto, chalky bluestem, broomsedge bluestem, scattered areas of water oaks, and pineland threeawn.

These soils are poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, these soils are suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, these soils are well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, these soils are well suited to pasture. A water-control system is needed to remove excess water during the wet season. They are well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

These soils are moderately suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, and chalky bluestem. Management practices should include deferred grazing and brush control. The Hilolo, Jupiter, and Margate soils are in the Upland Hardwood Hammock range site.

These soils have severe limitations for most urban uses because of wetness and depth to bedrock. They have severe limitations for septic tank absorption fields because of wetness, depth to bedrock, poor filtration, and slow percolation. If these soils are used as a septic tank absorption field, they should be mounded to maintain the system well above the seasonal high water table. For recreational uses, these soils also have severe limitations because of wetness, depth to bedrock, and the sandy texture; however, with proper drainage to remove the excess surface water during wet periods, many of the effects of these limitations can be overcome.

The Hilolo soil is in capability subclass IIIw. The Jupiter and Margate soils are in capability subclass IVw.

32—Urban land

About 75 percent or more of Urban land consists of areas that are covered by streets, buildings, parking lots, shopping centers, highways, industrial areas, airports, and other urban structures. Small areas of undisturbed soils are mostly in lawns, vacant lots, playgrounds, and green areas. The original soil in some areas has been altered by filling, grading, and shaping. Urban land is nearly level, except for some parking areas that are sloped to remove excess water. Individual areas are usually rectangular in shape and range from about 10 to 1,200 acres in size. The slope is 0 to 2 percent.

Included soils in this map unit are small areas of Boca, Hallandale, Immokalee, and Myakka soils that have with less than 12 inches of fill material spread over the surface. These soils make up about 25 percent or less of the unit.

The depth to the water table varies according to the amount of fill material and the extent of artificial drainage in a mapped area.

The present land use preludes the use of this map unit for other uses; therefore, this map unit is not rated for other uses.

This map unit has not been assigned a capability subclass.

33—Urban land-Holopaw-Basinger complex

These areas of Urban land and nearly level, poorly drained soils are in urban areas. Individual areas are blocky to irregular in shape, and they range from 20 to 500 acres in size.

Typically, Urban land consists of commercial buildings, houses, parking lots, streets, sidewalks, recreational areas, shopping centers, and other urban structures where the soil cannot be observed.

Typically, the Holopaw soil has a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer is fine sand to a depth of about 52 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 62 inches. The upper part of the subsoil is dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. The substratum is gray loamy fine sand to a depth of about 80 inches.

Typically, the Basinger soil has a surface layer of grayish brown fine sand about 3 inches thick. The subsurface layer is light gray fine sand to a depth of about 25 inches. The subsoil is brown fine sand to a depth of about 44 inches. The substratum is brown fine sand to a depth of about 80 inches.

In 90 percent of the areas mapped as Urban land-Holopaw-Basinger complex, Urban land makes up about 45 percent of the unit, the Holopaw soil makes up about 35 percent, and the Basinger soil makes up about 20 percent. In the remaining areas, the major components make up either a higher or lower percentage of the mapped areas. They occur as areas so intricately mixed or so small that mapping them separately was not practical. The Holopaw and Basinger soils may have been filled or reworked to accommodate urban land uses.

The permeability in the Holopaw soil is moderate to moderately slow, and the available water capacity is moderate. The permeability in the Basinger soil is rapid, and the available water capacity is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days. Most areas have had a drainage system installed to help to control the seasonal high water table and the runoff.

The present land use precludes the use of this map unit for cultivated crops, citrus, or tame pasture. Because of the complexity of this map unit, onsite investigations should be made for urban and recreational development and for septic tank absorption fields.

This map unit has not been assigned a capability subclass.

34—Urban land-Immokalee-Oldsmar, limestone substratum, complex

These areas of Urban land and nearly level, poorly drained soils are in urban areas. Individual areas are blocky to irregular in shape, and they range from 20 to 500 acres in size. The slope is 0 to 2 percent.

Typically, Urban land consists of commercial buildings, houses, parking lots, streets, sidewalks, recreational

areas, shopping centers, and other urban structures where the soil cannot be observed.

Typically, the Immokalee soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer is light gray fine sand to a depth of about 35 inches. The subsoil is fine sand to a depth of about 40 inches. The upper part of the subsoil is black, the next part is dark reddish brown, and the lower part is dark brown. The substratum is very pale brown fine sand to a depth of about 80 inches.

Typically, the Oldsmar soil has a surface layer of dark grayish brown fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 35 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 60 inches. The upper part of the subsoil is black fine sand, the next part is very dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. Limestone bedrock is at a depth of about 60 inches.

In 90 percent of the areas mapped as Urban land-Immokalee-Oldsmar, limestone substratum, complex, Urban land makes up about 45 percent of the unit, the Immokalee soil makes up about 35 percent, and the Oldsmar soil makes up about 20 percent. In the remaining areas, the major components make up either a higher or lower percentage of the mapped areas. They occur as areas so intricately mixed or so small that mapping them separately was not practical. The Immokalee and Oldsmar soils may have been filled or reworked to accommodate urban land uses.

The permeability in the Immokalee soil is moderate, and the available water capacity is low. The permeability in the Oldsmar soil is moderately slow, and the available water capacity is low. Under natural conditions, the seasonal high water table is at a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches during extended dry periods. Most areas have had a drainage system installed to help to control the seasonal high water table and the runoff.

The present land use precludes the use of this map unit for cultivated crops, citrus, or tame pasture. Because of the complexity of this map unit, onsite investigations should be made for urban and recreational development and for septic tank absorption fields.

This map unit has not been assigned a capability subclass.

35—Urban land-Aquents complex, organic substratum

This map unit consists of Urban land and soil materials that have been dug from different areas in the county and have been spread over the muck soils for coastal urban development. Individual areas are blocky to irregular in shape, and they range from 20 to 300 acres in size. The slope is 0 to 2 percent.

Typically, Urban land consists of commercial buildings, houses, parking lots, streets, sidewalks, recreational areas, shopping centers, and other urban structures where the soil cannot be observed. The depth of fill material used in the construction of urban areas ranges from 30 to more than 80 inches.

No single pedon represents Aquents, but a common profile has a surface layer of mixed yellowish brown, light gray, and grayish brown fine sand that has about 15 percent limestone pebbles and shell fragments to a depth of 38 inches. Below this, to a depth of 80 inches or more, is dark reddish brown muck.

In 90 percent of the areas mapped as Urban land-Aquents complex, organic substratum, Urban land makes up 60 to 75 percent of the unit and Aquents make up 26 to 40 percent. In the remaining areas, the major components make up either a higher or lower percentage of the mapped areas. Included in mapping are areas that do not have gravelly fill and may contain layers of sandy loam or sandy clay loam fill.

The depth to the water table varies depending upon the amount of fill material and the extent of artificial drainage in a mapped area.

The present land use precludes the use of this map unit for other uses. Because of the complexity of this map unit, onsite investigations should be made for urban and recreational development and for septic tank absorption fields.

This map unit has not been assigned a capability subclass.

36—Udorthents, shaped

These nearly level to undulating, somewhat poorly drained to moderately well drained soils are on golf courses and in adjacent areas where the soil material has been mechanically altered and shaped. Individual areas are elongated and irregular in shape, and they range from 40 to 640 acres in size. The slope is 1 to 6 percent.

No single pedon represents Udorthents, but a common profile has a surface layer of mixed grayish brown and pale brown fine sandy loam to a depth of 18 inches. The next layer is gray gravelly fine sand to a depth of about 37 inches. The subsoil is light brownish gray fine sandy loam to a depth of about 47 inches. Limestone bedrock is at a depth of about 47 inches.

This map unit is composed of many altered soils that have widely differing chemical and physical characteristics. Some areas may be composed of soils that are fine sand to a depth of 80 inches.

The depth to the water table varies depending upon the amount of fill material and extent of irrigation and artificial drainage in a mapped area.

The present land use preludes the use of this map unit for other uses; therefore, this map unit is not rated for other uses.

This map unit has not been assigned a capability subclass.

37—Tuscawilla fine sand

This nearly level, poorly drained soil is on flatwoods and in hammocks. Individual areas are irregular and elongated in shape, and they range from 10 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 6 inches thick. The subsurface layer is light gray fine sand to a depth of about 14 inches. The subsoil is sandy clay loam to a depth of about 50 inches. The upper part of the subsoil is mottled, dark grayish brown; the next part is mottled, grayish brown; and the lower part is gray. The substratum is gray loamy fine sand to a depth of about 80 inches.

In 80 percent of the areas mapped as Tuscawilla fine sand, Tuscawilla and similar soils make up 80 to 98 percent of the map unit. In the remaining areas, the Tuscawilla soil makes up either a higher or lower percentage of the mapped areas. The characteristics of Oldsmar soils are similar to those of the Tuscawilla soil.

The dissimilar soils in this map unit are small areas of Wabasso soils in sloughs.

The permeability of this soil is moderate. The available water capacity is low. Under natural conditions, the seasonal high water table is at a depth of 6 to 18 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 18 inches, and it recedes to a depth of more than 40 inches during extended dry periods.

The natural vegetation consists of oaks, cabbage palm, red maple, red bay, South Florida slash pine, waxmyrtle, maidencane, and chalky bluestem.

This soil is poorly suited to cultivated crops because of the wetness and droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, this soil is well suited to pasture. A water-control system is needed to remove excess water during the wet season. This soil is well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is moderately suited to range. The dominant forage consists of chalky bluestem and blue maidencane. Management practices should include deferred grazing and brush control. This Tuscawilla soil is in the Wetland Hardwood Hammock range site.

This soil has severe limitations for most urban uses and septic tank absorption fields because of wetness. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of wetness and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of these limitations can be overcome.

This Tuscawilla soil is in capability subclass IIIw.

38—Urban land-Matlacha-Boca complex

These areas of Urban land and nearly level, somewhat poorly drained and poorly drained soils are in urban areas and rock quarries. Individual areas are blocky and irregular in shape, and they range from 20 to 640 acres in size. The slope is 0 to 2 percent.

Typically, Urban land consists of commercial buildings, houses, parking lots, streets, sidewalks, recreational areas, shopping centers, and other urban structures where the soil cannot be observed.

Typically, the Matlacha soil has a surface soil of dark brown and light brownish gray gravelly fine sand about 21 inches thick. The next layer is fine sand to a depth of about 51 inches. The upper part of this layer is very dark gray, and the lower part is dark gray. The subsoil is pale brown fine sandy loam to a depth of about 54 inches. Limestone bedrock is at a depth of about 54 inches.

Typically, the Boca soil has a surface layer of very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper part of the subsurface layer is light gray, and the lower part is

brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

In 90 percent of the areas mapped as Urban land-Matlacha-Boca complex, Urban land makes up about 45 percent of the unit, the Matlacha soil makes up about 30 percent, and the Boca soil makes up about 25 percent. In the remaining areas, the major components make up either a higher or lower percentage of the mapped areas. They occur as areas so intricately mixed or so small that mapping them separately was not practical. The Boca soil may have been filled or reworked to accommodate urban land uses. The depth to the water table varies depending upon the amount of fill material and the extent of artificial drainage.

The present land use precludes the use of this map unit for other uses. Because of the complexity of this map unit, onsite investigations should be made for urban and recreational development and for septic tank absorption field sites.

This map unit has not been assigned a capability subclass.

39—Satellite fine sand

This nearly level, somewhat poorly drained soil is on low coastal ridges. Individual areas are elongated and irregular in shape, and they range from 10 to 400 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is gray fine sand about 3 inches thick. The substratum is light gray to white fine sand to a depth of about 80 inches.

In 95 percent of the areas mapped as Satellite fine sand, the Satellite soil makes up 81 to 100 percent of the map unit. In the remaining areas, it makes up either a higher or lower percentage of the mapped areas.

The dissimilar soils in this map unit are small areas of Oldsmar soils in landscape positions similar to those of the Satellite soil.

The permeability of this soil is very rapid. The available water capacity is very low. Under natural conditions, the seasonal high water table is at a depth of 18 to 42 inches for 1 to 6 months during most years. During the other months, the water table is below a depth of 40 inches.

The natural vegetation consists of Florida rosemary, sand live oak, South Florida slash pine, saw palmetto, prickly pear, pineland threeawn, and creeping bluestem.

This soil is poorly suited to cultivated crops because of the droughtiness. The number of adapted crops is limited unless very intensive management practices are used. With good water-control and soil-improving measures, this soil is suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Because of the rapid permeability, the water table is difficult to maintain. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, the soil is well suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

This soil is moderately suited to pasture. Pangolagrass and bahiagrass are adapted species, but they produce only fair yields with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

This soil is poorly suited to range. The dominant forage consists of creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. The dense growth of scrubby oaks, saw palmetto, and other shrubs dominates the desirable forage. Management practices should include deferred grazing and brush control. Livestock usually do not use this range site, except for protection and as dry-bedding ground during the wet seasons. This Satellite soil is in the Sand Pine Scrub range site.

This soil has severe limitations for most urban uses because of wetness and droughtiness. It has severe limitations for septic tank absorption fields because of wetness and poor filtration. If this soil is used as a septic tank absorption field, it should be mounded to maintain the system well above the seasonal high water table. For recreational uses, this soil also has severe limitations because of wetness and the sandy texture; however, with proper drainage to remove excess surface water during wet periods, many of the effects of the wetness can be overcome. Suitable topsoil or other material should be added to improve trafficability.

This Satellite soil is in capability subclass VIs.

40—Durbin and Wulfert mucks, frequently flooded

These level, very poorly drained soils are in tidal mangrove swamps. Individual areas are elongated and irregular in shape, and they range from 50 to 1,000 acres in size. The slopes are 0 to 1 percent.

Typically, the Durbin soil has a surface soil of dark reddish brown to black muck about 63 inches thick. The substratum is dark gray fine sand to a depth of about 80 inches.

Typically, the Wulfert soil has a surface soil of dark reddish brown to black muck about 40 inches thick. The substratum is dark gray fine sand to a depth of about 80 inches.

Mapped areas can consist entirely of the Durbin soil, entirely of the Wulfert soil, or any combination of the two soils. The two soils were not separated in mapping because of similar management needs resulting from the tidal flooding.

The dissimilar soils in this map unit are small areas of Kesson and Pennsuco soils in similar landscape positions. These soils make up about 0 to 10 percent of the unit.

The permeability in the Durbin soil is rapid, and the available water capacity is high. The permeability in the Wulfert soil is rapid, and the available water capacity is moderate. The water table fluctuates with the tide. It is within a depth of 12 inches for most of the year. The soil is subject to tidal flooding.

The natural vegetation consists of red, white, and black mangroves.

These soils are not suited to citrus, cultivated crops, or tame pasture because of the flooding and the high content of salts.

These soils have severe limitations for urban and recreational development and septic tank absorption fields. Extensive measures must be taken for urban uses. Adequate drainage outlets are not available, and the cost of site improvement generally outweighs the benefits of urban development in areas of these soils.

The Durbin and Wulfert soils are in capability subclass VIIIw.

41—Urban land-Satellite complex

These areas of Urban land and nearly level, somewhat poorly drained soils are in urban areas. Individual areas are blocky to irregular in shape, and they range from 20 to 500 acres in size. The slope is 0 to 2 percent.

Typically, Urban land consists of commercial buildings, houses, parking lots, streets, sidewalks, recreational areas, shopping centers, and other urban structures where the soil cannot be observed.

Typically, the Satellite soil has a surface layer of gray fine sand about 3 inches thick. The substratum is light gray to white fine sand to a depth about 80 inches.

In 90 percent of the areas mapped as Urban land-Satellite complex, Urban land makes up about 60 percent of the unit and the Satellite soil makes up about 40 percent. In the remaining areas, the major components make up either a higher or lower percentage of the mapped areas. Urban land and Satellite soils occur as areas so intricately mixed or so small that mapping them separately was not practical. The Satellite soil may have been filled or reworked to accommodate urban land uses.

The permeability in the Satellite soil is very rapid. The available water capacity is very low. Under natural conditions, the seasonal high water table is at a depth of 18 to 40 inches for 1 to 4 months during most years. During the other months, the water table is below a depth of 40 inches.

The present land use precludes the use of this map unit for cultivated crops, citrus, or tame pasture. Because of the complexity of this map unit, onsite investigations should be made for urban and recreational development and for septic tank absorption field sites.

This map unit has not been assigned a capability subclass.

42—Canaveral-Beaches complex

This map unit consists of the nearly level, moderately well drained Canaveral soil on low ridges and areas of Beaches. Individual areas are elongated and irregular in shape, and they range from 20 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the Canaveral soil has surface layer of dark brown fine sand about 4 inches thick. The substratum is brown to light gray fine sand that is mixed with shell fragments to a depth of about 80 inches.

Typically, Beaches consist of sand that is mixed with shell fragments and shells. Beaches are subject to frequent wave action.

In 90 percent of the areas mapped as Canaveral-Beaches complex, the Canaveral soil makes up 55 percent of the unit and Beach areas make up about 45 percent. In the remaining areas, the major components make up either a higher or lower percentage of the mapped areas. Canaveral soils and Beaches occur as areas so intricately mixed or so small that mapping them separately was not practical.

The permeability in the Canaveral soil is rapid or very rapid. The available water capacity is very low. During most years, the seasonal high water table is at a depth of 18 to 36 inches for 1 to 6 months. During the other months, the water table is below a depth of 40 inches. This soil is subject to tidal flooding under severe weather conditions.

The natural vegetation consists of Australian pines, sea oats, sea grape, cabbage palm, Brazilian pepper, and salt-tolerant herbaceous plants (fig. 6).

This map unit is not suited to citrus, row crops, or tame pasture because of droughtiness and the high content of salts.

This map unit has severe limitations as a site for buildings and septic tank absorption fields because of tidal

Figure 6.—An area of Canaveral-Beaches complex. The dominant vegetation in areas of the Canaveral soil includes cabbage palm, Australian pine, and salt-tolerant herbaceous plants.

flooding and wetness. For most recreational uses, this soil also has severe limitations because of tidal flooding, wetness, and the sandy surface texture; however, it is well suited to beach and water-related activities.

This map unit has not been assigned a capability subclass.

43—Winder, Riviera, limestone substratum, and Chobee soils, depressional

These level, very poorly drained soils are in marshes. Individual areas are elongated and irregular in shape, and they range from 100 to 1,000 acres in size. The slope is 0 to 1 percent.

Typically, the Winder soil has a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 50 inches. The upper part of the subsoil is gray fine sandy loam, the next part is gray sandy clay loam, and the lower part is dark gray sandy clay. The subsoil is white fine sandy loam to a depth of about 80 inches.

Typically, the Riviera soil has a surface layer of gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 32 inches. The upper part of the subsurface layer is light brownish gray, and the lower part is light gray. The subsoil is sandy clay loam to a depth of about 54 inches. The upper part of the subsoil is grayish brown, and the lower part is dark gray. Limestone bedrock is at a depth of about 54 inches.

Typically, the Chobee soil has a surface layer of mucky fine sand about 6 inches thick. The subsurface layer is black fine sandy loam to a depth of about 13 inches. The subsoil is mottled sandy clay loam to a depth of about 47

inches. The upper part of the subsoil is dark gray, and the lower part is gray. The substratum is dark greenish gray and gray fine sandy loam to a depth of about 80 inches.

Mapped areas can consist entirely of the Winder soil, entirely of Riviera and similar soils, entirely of the Chobee soil, or any combination of the three soils. The three soils were not separated in mapping because of similar management needs resulting from the ponding. The characteristics of Pineda soils are similar to those of the major soils.

The dissimilar soils in this map unit are small areas of Gator and Boca soils in similar landscape positions. These soils make up about 0 to 15 percent of the unit. A large area of muck is in the Corkscrew Swamp sanctuary.

The permeability in the Winder and Chobee soils is slow or very slow. The available water capacity of both soils is moderate. The permeability in the Riviera soil is moderately rapid to moderately slow. The available water capacity is low. Under natural conditions, the soils in this unit are ponded for 6 months or more during most years.

These soils are not suited to cultivated crops, citrus, or tame pasture because of ponding and wetness. They are used for natural wetlands. The natural vegetation consists of sawgrass, maidencane, pickerelweed, fireflag, willow, and other wetland plants. The Winder, Riviera, and Chobee soils are in the Freshwater Marshes and Ponds range site.

These soils have severe limitations for all urban and recreational uses because of ponding. They also have severe limitations for septic tank absorption fields because of ponding, slow percolation, and poor filtration. An effective drainage system that keeps the water table at a given depth is expensive and difficult to establish and maintain. Also, these soils act as a collecting basin for the area; therefore, a suitable outlet to remove the water is not available in many places. They require an adequate amount of fill material to maintain house foundations and road beds above the high water table. Even when a good drainage system is installed and the proper amount of fill material is added, keeping the area dry is a continual problem because of seepage water from the slightly higher adjacent slough and flatwood areas.

The Winder, Riviera, and Chobee soils are in capability subclass VIIw.

45—Paola fine sand, gently rolling

This nearly level to gently rolling, excessively drained soil is on coastal dunes on Marco Island. Individual areas are elongated and irregular in shape, and they range from 10 to 100 acres in size. The slope is 1 to 8 percent.

Typically, the surface layer is gray fine sand about 3 inches thick. The subsurface layer is white fine sand to a depth of about 32 inches. The subsoil is yellowish brown fine sand to a depth of about 45 inches. The substratum is brownish yellow and yellowish brown fine sand to a depth of about 80 inches.

In 95 percent of the areas mapped as Paola fine sand, gently rolling, the Paola soil makes up 90 to 98 percent of the map unit. In the remaining areas, it makes up either a higher or lower percentage of the mapped areas.

The permeability of this soil is very rapid. The available water capacity is very low. The seasonal high water table is at a depth of more than 72 inches during most years.

The natural vegetation consists of sand pine, slash pine, sand live oak, running oak, prickly pear, creeping dodder, pineland threeawn, and mosses.

This soil is suited to various uses, such as the production of citrus and row crops and as range. However, because of urban encroachment, it is not used for these purposes.

This soil has slight limitations for most urban development and septic tank absorption fields. It has severe limitations for recreational uses because it is too sandy. Suitable topsoil or other natural soil material should be added to improve trafficability.

This Paola soil is in capability subclass VIs.

48—Pennsuco silt loam

This level, poorly drained soil is on low prairies. Individual areas are elongated and irregular in shape, and they range from 20 to 300 acres in size. The slope is 0 to 1 percent.

Typically, the surface layer is very dark gray silt loam about 5 inches thick. The subsoil is dark gray silt loam to a depth of about 40 inches. The substratum is grayish brown fine sand to a depth of about 48 inches. Limestone bedrock is at a depth of about 48 inches.

In 95 percent of the area mapped as Pennsuco silt loam, the Pennsuco soil makes up 90 to 98 percent of the map unit. In the remaining areas, it makes up either a higher or lower percentage of the mapped areas.

The permeability of this soil is moderate to moderately slow. The available water capacity is high. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 4 to 6 months during most years. A few inches of water is above the surface during extremely wet periods.

The natural vegetation consists of sawgrass, reeds, scattered areas of cypress, maidencane, needlegrass, sedges, waxmyrtle, and other wetland plants.

This soil is poorly suited to cultivated crops because of the wetness and the high soil reaction (pH). With adequate water control, a limited variety of vegetable crops can be grown. The low elevation makes adequate water control difficult. A crop rotation in which row crops are followed by cover crops is needed. Planting on raised

beds elevates the plants above the high water table. All crop residue and cover crops should be used to maintain the organic matter content. Applications of fertilizers that include minor elements are needed.

This soil is moderately suited to range. The dominant forage consists of maidencane and needlegrass. The Pennsuco soil is in the Slough range site.

This soil has severe limitations for all urban and recreational uses because of wetness. It has severe limitations for septic tank absorption fields because of wetness and the slow infiltration rate. An effective drainage system that keeps the water table at a given depth is expensive and difficult to establish and maintain. This soil requires an adequate amount of fill material to maintain house foundations and road beds above the high water table. Even when a good drainage system is installed and the proper amount of fill material is added, keeping the area dry is a continual problem because of seepage from the slightly higher adjacent flatwood areas.

This Pennsuco soil is in capability subclass IVw.

49—Hallandale and Boca fine sands

These nearly level, poorly drained soils are in sloughs and poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 20 to 600 acres in size. The slope is 0 to 2 percent.

Typically, the Hallandale soil has a surface layer of very dark gray fine sand about 3 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 9 inches. The subsoil is yellowish brown fine sand to a depth of about 12 inches. Limestone bedrock is at a depth of about 12 inches.

Typically, the Boca soil has a surface layer of very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper part of the subsurface layer is light gray, and the lower part is brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

Mapped areas can consist entirely of Hallandale and similar soils, entirely of the Boca soil, or any combination of the two soils. The two soils were not separated in mapping because of similar management needs and soil characteristics. The characteristics of Jupiter soils are similar to those of the major soils.

The dissimilar soils in this map unit are small areas of Copeland and Pineda, limestone substratum, soils in similar landscape positions. These soils make up about 0 to 5 percent of the unit.

The permeability in the Hallandale soil is rapid. The permeability in the Boca soil is moderate. The available water capacity of both soils is very low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of scrub cypress, sand cordgrass, waxmyrtle, and maidencane.

These soils are poorly suited to cultivated crops because of the wetness, the shallow depth to bedrock, and droughtiness. With good water-control and soil-improving measures, these soils are suitable for many fruit and vegetable crops. A water-control system is needed to remove excess water during wet seasons and to provide water through subsurface irrigation during dry seasons. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

With proper water-control measures, these soils are moderately suited to citrus. A water-control system that maintains good drainage to an effective depth is needed. Planting on raised beds provides good surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soils from blowing when the trees are younger.

With good water-control management, these soils are well suited to pasture. A water-control system is needed to remove excess water during the wet season. They are well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

These soils are well suited to range. The dominant forage consists of blue maidencane, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. The Hallandale and Boca soils are in the Slough range site.

These soils have severe limitations for most urban uses because of the high water table and the shallow depth to bedrock. They have severe limitations for septic tank absorption fields because of wetness, the shallow depth to bedrock, and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. These soils also have severe limitations for recreational development because of wetness, the shallow depth to bedrock, and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be

overcome by adding suitable topsoil or by resurfacing the area.

The Hallandale and Boca soils are in capability subclass Vw.

50—Ochopee fine sandy loam, low

This level, poorly drained soil is on low prairies. Individual areas are elongated and irregular in shape, and they range from 20 to 400 acres in size. The slope is 0 to 1 percent.

Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsoil is dark gray fine sandy loam to a depth of about 17 inches. Limestone bedrock is at a depth of about 17 inches.

In 90 percent of the areas mapped as Ochopee fine sandy loam, low, the Ochopee soil makes up 90 to 98 percent of the map unit. In the remaining areas, it makes up either a higher or lower percentage of the mapped areas. This map unit contains as much as 10 percent rock outcrop.

The permeability of this soil is moderately rapid. The available water capacity is very low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months during most years. During the other months, the water table is below a depth of 12 inches. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

This soil is not suited to citrus because of the shallow depth to bedrock and the high soil reaction.

The natural vegetation consists of scrub cypress, cordgrass, rushes, sedges, and South Florida bluestem.

This soil is poorly suited to cultivated crops because of the wetness and the high soil reaction (pH). With adequate water control, a limited variety of vegetables can be grown. The low elevation, the shallow depth to rock, and the frequent heavy rains make adequate water control difficult to establish. A crop rotation in which row crops are followed by cover crops is needed. All crop residue and cover crops should be used to maintain the organic matter content. Applications of fertilizers that include minor elements are needed.

This soil is moderately suited to range. The dominant forage consists of South Florida bluestem and plumegrass. This Ochopee soil is in the Slough range site.

This soil has severe limitations for most urban uses and septic tank absorption fields because of the high water table and the shallow depth to bedrock. Building sites and septic tank absorption fields should be mounded to overcome these limitations. This soil also has severe limitations for recreational development because of wetness and the shallow depth to bedrock. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table.

This Ochopee soil is in capability subclass IVw.

51—Ochopee fine sandy loam

This nearly level, poorly drained soil is in low wetland hardwood areas. Individual areas are elongated and irregular in shape, and they range from 20 to 400 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsoil is dark gray fine sandy loam to a depth of about 17 inches. Limestone bedrock is at a depth of about 17 inches.

In 95 percent of the area mapped as Ochopee fine sandy loam, the Ochopee soil makes up 85 to 100 percent of the map unit. In the remaining areas, it makes up either a higher or lower percentage of the mapped areas. This map unit contains as much as 10 percent rock outcrop.

The permeability of this soil is moderately rapid. The available water capacity is very low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

This soil is not suited to citrus because of the shallow depth to bedrock and the high soil reaction.

The natural vegetation consists of scrub cypress, waxmyrtle, Rhyncoapusa, South Florida bluestem, and sedges.

This soil is poorly suited to cultivated crops because of the wetness and the high soil reaction (pH). With adequate water control, a limited variety of vegetables can be grown. The low elevation, the shallow depth to rock, and the frequent heavy rains make adequate water control difficult to establish. A crop rotation in which row crops are followed by cover crops is needed. All crop residue and cover crops should be used to maintain the organic matter content. Applications of fertilizers that include minor elements are needed.

This soil is moderately suited to range. The dominant forage consists of maidencane and cutgrass. The Ochopee soil is in the Scrub Cypress range site.

This soil has severe limitations for most urban uses and septic tank absorption fields because of the high water table and the shallow depth to bedrock. Building sites and septic tank absorption fields should be mounded to overcome these limitations. This soil also has severe limitations for recreational development because of wetness and the shallow depth to bedrock. The problems

associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table.

The Ochopee soil is in capability subclass IVw.

52—Kesson muck, frequently flooded

This level, very poorly drained soil is in frequently flooded tidal marshes. Individual areas are elongated and irregular in shape, and they range from 300 to 1,000 acres in size. The slope is 0 to 1 percent.

Typically, the surface layer is black muck about 5 inches thick. The subsurface layer is dark gray fine sand to a depth of about 10 inches. The substratum is fine sand to a depth of about 80 inches. The upper part of the substratum is gray, the next part is light brownish gray, and the lower part is pale brown.

In 80 percent of the area mapped as Kesson muck, frequently flooded, the Kesson soil makes up 75 to 90 percent of the map unit. In the remaining areas, it makes up either a higher or lower percentage of the mapped areas.

The dissimilar soils in this map unit are small areas of Basinger, Dania, and Peckish soils in landscape positions similar to those of the Kesson soil. These soils make up about 10 to 25 percent of the unit.

The permeability of this soil is rapid to moderately rapid. The available water capacity is high. The water table fluctuates with tidal action and seasonal rainfall. It is at or near the surface for long periods. This soil is frequently flooded.

This soil is not suited to cultivated crops, tame pasture, or citrus because of the flooding and the high content of salts. It is used for natural wetlands. The natural vegetation consists of cordgrass, saltgrass, rushes, needlegrass, saltwort, and scattered areas of mangroves.

This soil has severe limitations for urban and recreational development. Extensive measures must be taken to use this soil for urban development. Adequate drainage outlets are not available, and the cost of site improvement generally outweighs the benefits of urban development in areas of this soil.

This Kesson soil is in capability subclass VIIIw.

53—Estero and Peckish soils, frequently flooded

These level, very poorly drained soils are in frequently flooded tidal marshes. Individual areas are elongated and irregular in shape, and they range from 300 to 1,000 acres in size. The slope is 0 to 1 percent.

Typically, the Estero soil has a surface layer of black muck about 6 inches thick. The subsurface layer is fine sand to a depth of about 40 inches. The upper part of the subsurface layer is black, and the lower part is dark grayish brown. The subsoil is dark brown and very dark brown fine sand to a depth of about 62 inches.

Typically, the Peckish soil has a surface layer of very dark grayish brown mucky fine sand about 9 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 37 inches. The subsoil is dark brown fine sand to a depth of about 42 inches. The substratum is light brownish gray fine sand to a depth of about 80 inches.

Mapped areas can consist entirely of the Estero soil, entirely of the Peckish soil, or any combination of the two soils. The two soils were not separated in mapping because of similar management needs resulting from the flooding.

The dissimilar soils in this map unit are small areas of Wulfert soils in similar landscape positions. These soils make up about 0 to 5 percent of the unit.

The permeability in the Estero soil is moderately rapid, and the available water capacity is moderate. The permeability in the Peckish soil is rapid, and the available water capacity is moderate. The water table fluctuates with tidal action and seasonal rainfall. It is at or near the surface for long periods. These soils are frequently flooded.

These soils are not suited to cultivated crops, tame pasture, or citrus because of the flooding and the high content of salts. They are used for natural wetlands. The natural vegetation consists of cordgrass, saltgrass, rushes, needlegrass, saltwort, and scattered mangrove.

These soils have severe limitations for urban and recreational development and septic tank absorption fields because of flooding. Extensive measures must be taken for urban uses. Adequate drainage outlets are not available, and the cost of site improvement generally outweighs the benefits of urban development in areas of these soils.

The Estero and Peckish soils are in capability subclass VIIIw.

54—Jupiter-Boca complex

These nearly level, very poorly drained and poorly drained soils are in sloughs and low wetland hardwood areas. Individual areas are elongated and irregular in shape, and they range from 30 to 400 acres in size. The slope is 0 to 2 percent.

Typically, the very poorly drained Jupiter soil has a surface layer of black mucky fine sand about 4 inches thick. The subsurface layer is very dark grayish brown fine sand to a depth of about 10 inches. Limestone bedrock is at a depth of about 10 inches.

Typically, the poorly drained Boca soil has a surface layer of very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26

inches. The upper part of the subsurface layer is light gray, and the lower part is brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

In 80 percent of the areas mapped as Jupiter-Boca complex, Jupiter and similar soils make up 50 to 70 percent of the unit and Boca and similar soils make up 30 to 45 percent. In the remaining areas, the major soils make up either a higher or lower percentage of the mapped areas. The characteristics of Hallandale and Margate soils are similar to those of the major soils.

The dissimilar soils in this map unit are small areas of Copeland soils in similar landscape positions. These soils make up about 0 to 10 percent of the unit.

The permeability in the Jupiter soil is rapid, and the available water capacity is very low. The permeability in the Boca soil is moderate, and the available water capacity is very low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 4 to 8 months during most years. During the other months, the water table is below a depth of 12 inches, and it recedes to a depth of more than 30 inches during extended dry periods. During periods of high rainfall, the soil is covered by shallow, slowly moving water for about 7 days.

The natural vegetation consists of laurel oak, red maple, scrub cypress, cabbage palm, saw palmetto, waxmyrtle, pondapple, vines, panicum, ferns, plumegrass, Rhyncosporia (rush), South Florida bluestem, and gulf dune paspalum.

These soils are poorly suited to cultivated crops because of the wetness, the shallow depth to bedrock, and droughtiness. The number of adapted crops is limited unless good water-control and soil-improving measures are used. These soils are suitable for some vegetable crops if a water-control system that removes excess water during wet seasons and provides water through subsurface irrigation during dry seasons is used. The presence of rock near the surface, however, makes the construction of such a system difficult. Row crops should be rotated with cover crops. Seedbed preparation should include bedding of the rows. Applications of fertilizer and lime should be based on the needs of the crops.

These soils are poorly suited to citrus. Water-control systems that maintain good drainage to an effective depth are difficult to establish. Planting on raised beds provides surface and internal drainage and elevates the trees above the seasonal high water table. Planting a good grass cover crop between the trees helps to protect the soil from blowing when the trees are younger.

With good water-control management, these soils are well suited to pasture. A water-control system is needed to remove excess water during the wet season. These soils are well suited to pangolagrass, bahiagrass, and clover. Excellent pastures of grass or a grass-clover mixture can be grown with good management. Regular applications of fertilizer and controlled grazing are needed for the highest possible yields.

These soils are well suited to range. The dominant forage consists of blue maidencane, chalky bluestem, and bluejoint panicum. Management practices should include deferred grazing. The Jupiter and Boca soils are in the Scrub Cypress range site.

These soils have severe limitations for most urban uses because of the high water table and the shallow depth to bedrock. They have severe limitations for septic tank absorption fields because of wetness, the shallow depth to bedrock, and poor filtration. Building sites and septic tank absorption fields should be mounded to overcome these limitations. These soils also have severe limitations for recreational development because of wetness, the shallow depth to bedrock, and the sandy texture. The problems associated with wetness can be corrected by providing adequate drainage and drainage outlets to control the high water table. The sandy texture can be overcome by adding suitable topsoil or by resurfacing the area.

The Jupiter soil is in capability subclass VIw, and the Boca soil is in capability subsoil Vw.

56—Basinger fine sand, occasionally flooded

This nearly level, poorly drained soil is on occasionally flooded low ridges that are surrounded by tidal marshes. Individual areas are elongated and irregular in shape, and they range from 5 to 40 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is grayish brown fine sand about 3 inches thick. The subsurface layer is light gray fine sand to a depth of about 25 inches. The subsoil is brown fine sand to a depth of about 44 inches. The substratum is brown fine sand to a depth of about 80 inches.

In 95 percent of the areas mapped as Basinger fine sand, occasionally flooded, the Basinger soil makes up 90 to 98 percent of the map unit. In the remaining areas, it makes up either a higher or lower percentage of the mapped areas.

The dissimilar soils in this map unit are small areas of Immokalee soils in landscape positions similar to those of the Basinger soil. These soils make up 0 to 10 percent of this unit.

The permeability of this soil is rapid. The available water capacity is low. Under natural conditions, the seasonal high water table is within a depth of 12 inches for 3 to 6 months. During the other months, the water table is

below a depth of 12 inches, and it recedes to a depth of more than 40 inches during extended dry periods. During periods of storm tides, the soil is briefly flooded.

This soil is not suited to cultivated crops, citrus, or tame pasture because of occasional tidal flooding and the wetness. It is used for natural wetlands. The natural vegetation consists of sabal palm, gumbo limbo, strangler fig, oaks, orchids, and other wetland plants.

This soil has severe limitations for urban and recreational uses and septic tank absorption fields because of the high water table and occasional tidal flooding. Careful consideration should be given before using this soil for these land uses.

This Basinger soil is in capability subclass VIw.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops

John Lawrence, state resource conservationist, Natural Resources Conservation Service, helped to prepare this section.

General management needed for crops is suggested in this section. The crops best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Approximately 54,000 acres in Collier County is used for crops, according to the most recent estimates *(5)*. Of this total, about 19,000 acres is used for oranges and grapefruits and 35,000 acres is used for tomatoes, squash, peppers, cucumbers, watermelons, and nursery plants.

The acreage used for citrus crops (fig. 7) has been increasing as the industry has moved south, seeking increased protection from freezing temperatures. With proper water management, many of the soils in the survey area are well suited to the production of citrus crops. Urban development is increasing throughout Collier County, and it continues to be a major land use change in the survey area.

Wind erosion is a hazard on unprotected soils in the county. It can damage soils and tender crops in a few hours in open, unprotected areas if the winds are strong and the soil is dry and does not have a vegetative cover or surface mulch. It reduces soil fertility by removing fine soil particles and organic matter; damages or destroys crops by sandblasting; spreads diseases, insects, and weed seeds; and creates health hazards and cleaning problems. Controlling wind erosion minimizes the potential for dust storms and improves the quality of air. Maintaining a vegetative cover and surface mulching minimize the hazard of wind erosion.

Field windbreaks consisting of adapted trees and shrubs, such as Carolina laurel cherry, slash pine, southern redcedar, and Japanese privet, and strip crops of small grain reduce the hazard of wind erosion and minimize damage to crops. Field windbreaks and strip crops are narrow plantings made at right angles to the prevailing wind at specific intervals across the field. The intervals depend on the erodibility of the soil and the susceptibility of the crop to damage from sandblasting.

Information about the design of erosion-control

Figure 7.—Citrus trees on raised beds in an area of Immokalee fine sand. With proper management practices, many of the soils in the survey area are well suited to the production of citrus crops.

measures for each kind of soil in Collier County is contained in the "Water and Wind Erosion Control Handbook—Florida," which is available at the local office of the Natural Resources Conservation Service.

Soil drainage is a major management concern on almost all of the acreage used for crops and pasture in the survey area. Under natural conditions, some of the soils are so wet that the production of crops common to the area is generally not practical without extensive water-control systems. Unless artificially drained, some of the poorly drained soils, such as Riviera, Immokalee, Myakka, Oldsmar, Wabasso, and Pineda soils, are wet enough to damage pasture plants during wet seasons. They also have a low available water capacity and are droughty during dry periods. These soils must have subsurface irrigation to achieve maximum pasture production. The design of the surface drainage and subsurface irrigation systems varies according to the kind of soil and the pasture plants that are to be grown. A combination of surface drains and subsurface irrigation systems is needed on the poorly drained soils for intensive pasture production. Information about drainage and irrigation for each kind of soil is available from the local office of the Natural Resources Conservation Services.

Soil fertility is naturally low in most soils in the survey area. Most of the soils have a sandy surface layer and are light in color. Many of the soils, including Chobee and Wabasso soils, have a loamy subsoil. Satellite and Canaveral soils have sandy material to a depth of 80 inches or more. Myakka, Wabasso, Oldsmar, and Immokalee soils have an organic-stained layer in the subsoil. Most of the soils have a surface layer that is strongly acid or very strongly acid. If the soils have never been limed, they require applications of ground limestone to raise the pH level sufficiently for good growth of crops. The levels of nitrogen, potassium, and available phosphorus are naturally low in most of these soils. Additions of lime and fertilizer should be based on the results of current soil tests, the needs of the crops, and the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime required.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular and porous. Most of the soils in the survey area have a sand or loamy sand surface layer that is light in color and has a low to moderate content of organic matter. The exceptions include Chobee, Copeland, and Gator soils. Gator soil have an organic surface layer. Generally, the structure of the surface layer of most soils in the survey area is weak. In dry soils that have a low content of organic matter, intense rainfall causes colloidal matter to cement, forming a slight crust. The crust is slightly hard when dry, and it is slightly impervious to water. It reduces the infiltration rate and increases the runoff rate. Regular additions of crop residue, manure, and other organic material improve soil structure and reduce the formation of crusts.

Very few field crops are grown in the survey area. The acreage used for grain sorghum and potatoes can be increased if economic conditions are favorable. Rye is the most common close-growing crop. It is used mainly as a cover crop on fields where vegetables are grown.

Tomatoes are the primary specialty crop. Other specialty crops grown commercially in the county are watermelons, cucumbers, peppers, and a small acreage of squash, nursery plants, and sod. Bedding, plastic mulch, and water management are needed for the maximum production of crops (fig. 8). If economic conditions are favorable, the production of nursery plants, sod, cabbage, turnips, collards, and mustard greens can be increased. If drained, Gator, Myakka, Immokalee, Oldsmar, Wabasso, and Pineda soils are suited to vegetables and small fruit. The latest information about growing specialty crops can be obtained from the local offices of the Cooperative Extension Service and the Natural Resources Conservation Service.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of

Figure 8.—Management practices, such as bedding, using plastic mulch, and maintaining the water table, are required for the maximum production of vegetables.

soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use. There are no class I soils in this survey area.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices. There are no class II soils in this survey area.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *w* or *s,* to the class numeral, for example, IIIw. The letter *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage) and the letter *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

Rangeland and Pasture

Pete Deal and Sid Brantly, rangeland management specialists, Natural Resources Conservation Service, helped to prepare this section.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship of the soils, vegetation, and water.

Rangeland

Table 4 shows, for each soil, the range site and the potential annual production of vegetation for sites in excellent condition in favorable, average, and unfavorable years. Only those soils that are used as rangeland or are suited to use as rangeland are listed. An explanation of the column headings in the table follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic climax plant community that differs from natural plant communities on other range sites in kind, amount, or proportion of plants. The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of plants. Soil reaction, salt content, and a seasonal high water table are also important.

Potential annual production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the climax plant community. Total production includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants, but it does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, average, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In an average year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Range management requires a knowledge of the kinds of soil and of the potential climax plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the climax plant community on a particular range site. The more closely the existing community resembles the climax community, the better the range condition. Range condition is an *ecological* rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

One objective in range management may be to manage the plant community so that the plants growing on a site are about the same in kind and amount as the potential climax plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Livestock producers manage about 12,000 brood cows on approximately 160,000 acres of rangeland in Collier County *(5)*. This land provides food and cover for wildlife and filters and stores supplies of freshwater.

The native vegetation consists mainly of grasses, grasslike plants, herbaceous plants, and shrubs that are suitable for grazing. The rangeland in Collier County includes natural grasslands, savannahs, and lightly wooded lands. Many acres of rangeland were farmed and are now returning to native vegetation, although much of the area has been invaded by brush. Sound management plans for this land include practices described in the following paragraphs.

Proper grazing use requires manipulating the length and intensity of grazing so that no more than 50 percent of the current year's growth of desirable plants is removed each year. It is best accomplished by implementing a *planned grazing system*, which allows for deferment periods of at least two months during the growing season.

Weed and brush management can be used to alter the type and distribution of brush and weeds to approximate natural conditions. Mechanical treatment, chemical treatment, and prescribed burning may be used individually or in conjunction to achieve the range manager's goals. *Deferred grazing* improves the condition

and vigor of forage plants through a period of complete rest from any type of use by livestock. Generally, a deferment of at least 30 days or more some time during the active growing season (May-September) follows prescribed burning. A similar 90-day deferment follows mechanical treatment.

Range condition is a measure of the present plant community in relation to the potential climax native plant community.

The productivity of the sites is closely related to the natural drainage of the soil. The wettest soils, such as those in marshes, generally produce the greater amounts of vegetation. The deep, droughty, sandy soils normally produce the least amount of herbage annually.

Table 4 suggests a range of production potentials. It includes all vegetation, whether palatable to grazing animals or not. The production potential includes the current year's growth of leaves and twigs and the fruit of woody plants. It does not include the increase in stem diameter of trees and shrubs. The potential is expressed in pounds per acre of air-dry vegetation in years that have favorable, average, and unfavorable growing conditions.

Eight range sites are important for wildlife and livestock in the survey area. A brief description of each is provided in the following paragraphs.

South Florida Flatwoods. This range site is in nearly level areas. Scattered to numerous pine trees are common in the area, and saw palmetto, gallberry, and other woody plants are scattered throughout. This range site produces an abundant quantity of grasses. Creeping bluestem is the dominant grass, although the amounts of indiangrass, chalky bluestem, panicums, and pineland threeawn are significant.

If this range site deteriorates because of uncontrolled livestock grazing and annual burning, saw palmetto and pineland threeawn significantly increase in amount, and bluestems, indiangrass, and panicums decrease.

Slough. This range site generally consists of open grassland. It occurs as nearly level areas that form broad natural drainage courses. The potential plant community is dominated by blue maidencane, chalky bluestem, and bluejoint panicum. These grasses are all readily utilized by livestock. If overgrazing occurs for prolonged periods, carpetgrass and sedges replace the more productive grasses.

Freshwater Marsh and Ponds. This range site consists of an open grassland marsh or pond. It has potential for producing significant amounts of maidencane. The water level fluctuates throughout the year. During periods of high water, grazing by livestock is naturally deferred. This range site is a preferred grazing area for cattle, but it deteriorates with prolonged overgrazing. Pickerelweed, sawgrass, willow, and primrose increase if overuse continues.

Sand Pine Scrub. This range site is on nearly level to gently sloping uplands. It has a limited potential for producing native forage plants. It supports a relatively dense stand of sand pine trees and a dense, woody understory. Livestock do not use this site if other range sites are available. The main forage plants are lopsided indiangrass, bluestems, and low panicums.

Cabbage Palm Flatwoods. This range site consists of nearly level areas characterized by cabbage palm trees scattered throughout the landscape. If the site is in excellent condition, it is a preferred livestock grazing area that produces a high quality and quantity of forage plants. Creeping bluestem, chalky bluestem, and several panicum species are the dominant forage grasses. Pineland threeawn and saw palmetto increase in amount as the condition of the range site deteriorates.

Scrub Cypress. This range site consists of a relatively open grassland with small, scattered areas of cypress trees. If the site is in excellent condition, most of the grasses are South Florida bluestem and Gulf-dune paspalum. As the condition of the site deteriorates, rhyncospora, St. Johnswort, and white-top sedge increase in amount.

Upland Hardwood Hammock. This forested range site consists of nearly level areas that have a natural overstory of hardwoods, such as maple, live oak, laurel oak, and water oak. The site usually provides little forage because of an excessive amount of canopy cover. If the site is in excellent condition, switchgrass and chalky bluestem are important forage species. Broomsedge and wiregrass begin to dominate as the range condition deteriorates.

Wetland Hardwood Hammock. This range site is forested, nearly level, and somewhat poorly to poorly drained. Laurel oak, live oak, water oak, red maple, and cypress dominate the overstory, and switchgrass, maidencane, perennial blue maidencane, and chalky bluestem are important forage plants in the understory. This site is usually not very productive because of the excessive amount of tree canopy. Common carpetgrass is often found when the site degrades to poor condition.

Pasture

The 80,000 acres of pasture in Collier County provide some components of habitat necessary for a host of wildlife species. They also filter and store much of the county's supplies of fresh water. Livestock producers care for the land in such a way that it supports 18,000 brood cows. Much of the pasture in Collier County is managed

for bahiagrass, pangola digitgrass, limpograss, bermudagrass, and aeschynomene. Sound management practices, which include the control of weeds and applications of fertilizer and lime, if necessary, a planned grazing system, and water-control measures are needed to obtain desirable yields.

Bahiagrass is successfully managed with a stubble height of about 2 inches. Short grazing periods should be followed by a 3-week recovery period. Pangola digitgrass is best managed with a stubble height of about 4 to 6 inches and a 5-week recovery period. Limpograsses are successfully managed with a 9-week recovery period and a stubble height of about 6 inches.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from tropical rain and wind. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Additional information on planning windbreaks and screens and on planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

Recreation

In table 5, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations, if any exist, are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 8 and interpretations for dwellings without basements and for local roads and streets in table 7.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are nearly level and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm, and is not dusty when dry.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, and are not subject to flooding during the period of use.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. The suitability of the soil for tees or greens is not considered in rating the soils.

Figure 9.—Wood storks in an area of Basinger fine sand. Storks often use the same areas used for domestic livestock.

Wildlife Habitat

John F. Vance Jr., state biologist, Natural Resources Conservation Service, helped prepare this section.

Collier County has an abundant wildlife population. Except for the areas of urban development along the coast and the intensive agriculture in the Immokalee area, good habitat is present throughout the survey area—especially for wetland wildlife. Some of the more important areas are in the Fakahatchee Strand State Preserve, the Collier-Seminole State Park, and the Cape Romano-Ten Thousand Islands and Rookery Bay State Aquatic Preserves. The National Audubon Corkscrew Swamp Refugee provides one of the largest rookery areas for the endangered wood stork.

Primary game species are bobwhite quail and white-tailed deer. Other species include squirrel, feral hogs, snipe, waterfowl, raccoon, skunk, bobcat, otter, songbirds, woodpeckers, reptiles, amphibians, and a great variety of wading birds.

Numerous species of fish, such as black drum, redfish (red drum), sea trout, sheepshead, snook, and tarpon provide excellent opportunities for fishing in the brackish and saltwater areas. Snook and tarpon are species that are particularly prized. The 1,500-acre Lake Trafford and several smaller lakes and freshwater canals provide good opportunities for fishing, primarily for largemouth bass and various types of sunfish.

A number of endangered or threatened species are found in Collier County. They include species ranging from the seldom-seen Eastern indigo snake to more commonly known species, such as the wood stork (fig. 9) or bald eagle. A complete list of information about range and habitat can be obtained from the local office of the Natural Resources Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 6, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, soybeans, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bahiagrass, deervetch, clover, and sesbania.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, partridge pea, and bristlegrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, wild grape, red bay, cabbage palm, blackgum, sweetbay, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are cocoplum, beautyberry, and mulberry.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cypress.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, pickerelweed, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, blackbirds, and egrets.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, bear, and panther.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, egrets, herons, shore birds, alligator, mink, and otter.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 7 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any exist, are minor and easily overcome; *moderate* if soil properties or site features are somewhat restrictive for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable that special design, soil reclamation, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. Depth to a high water table, depth to bedrock, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They

have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 8 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any exist, are minor and easily overcome; *moderate* if soil properties or site features are moderately favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if one or more soil properties or site features are unfavorable for the use and if overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Bedrock interferes with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan,

depth to a water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 9 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10 or a high shrink-swell potential. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of

the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 10 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any exist, are minor and are easily overcome; *moderate* if soil properties or site features are somewhat restrictive for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are unfavorable for the use. Special design, possibly increased maintenance, or alteration are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are available at the local office of the Natural Resources Conservation Service.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 11 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and

plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 12 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from

0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loams, silt loams, clay loam, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 13 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under

normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than a 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent*; and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(9)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 14 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Psammaquent (*Psamm*, meaning sandy, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Psammaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is siliceous, hyperthermic Typic Psammaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(8)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(9)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Basinger Series

The Basinger series consists of nearly level, poorly drained soils in sloughs and poorly defined drainageways and on occasionally flooded low ridges surrounded by tidal marshes. These soils formed in sandy marine sediments. The slopes are less than 2 percent. These soils are siliceous, hyperthermic Spodic Psammaquents.

The Basinger soils are closely associated with Malabar, Immokalee, Myakka, and Oldsmar soils. Malabar soils are in landscape positions similar to those of the Basinger

soils. They have an argillic horizon at a depth of more than 40 inches. Immokalee, Myakka, and Oldsmar soils are in slightly higher positions on the flatwoods. Immokalee soils have a spodic horizon at a depth of 30 to 50 inches. Oldsmar soils have a spodic horizon and an argillic horizon at a depth of 30 to 70 inches. Myakka soils have a spodic horizon at a depth of 20 to 30 inches.

Typical pedon of Basinger fine sand, about 3,000 feet east and 300 feet south of the northwest corner of sec. 9, T. 48 S., R. 26 E.

A—0 to 3 inches; grayish brown (10YR 5/2) fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

E—3 to 25 inches; light gray (10YR 7/2) fine sand; common medium to coarse faint splotches of light gray (10YR 7/1) and very pale brown (10YR 7/3); single grained; loose; strongly acid; clear wavy boundary.

Bh/E—25 to 44 inches; brown (10YR 4/3) (Bh part) and light brownish gray (10YR 6/2) (E part) fine sand; common coarse distinct dark brown (5YR 3/3) weakly cemented bodies; single grained; loose; strongly acid; clear wavy boundary.

C—44 to 80 inches; brown (10YR 5/3) fine sand; single grained; loose; strongly acid.

The thickness of the solum ranges from 25 to 60 inches. Soil reaction is extremely acid to neutral. Texture is generally sand or fine sand to a depth of 80 inches or more; however, the surface layer is fine sand.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 2 or less. It is 2 to 8 inches thick.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 3 or has hue of 10YR, value of 7 or 8, and chroma of 3. It has common or many, medium to large faint splotches that have chroma of 1 and 3. The E horizon is 10 to 30 inches thick.

The Bh part of the Bh/E horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 4. The E part has hue of 2.5Y or 10YR, value of 5 to 8, and chroma of 1 to 3. Most pedons have few to many mottles or weakly cemented bodies in the Bh/E horizon. The thickness of the Bh/E horizon is 6 to 30 inches.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 4. Some pedons have thin strata of loamy fine sand.

Boca Series

The Boca series consists of level and nearly level, poorly drained and very poorly drained soils on the flatwoods and in sloughs, poorly defined drainageways, and marshes. These soils formed in moderately thick beds of sandy and loamy marine sediments deposited over limestone. The slopes are less than 2 percent. These soils are loamy, siliceous, hyperthermic Arenic Ochraqualfs.

The Boca soils are closely associated with Copeland, Hallandale, Jupiter, Riviera, and Malabar soils. These soils are in landscape positions similar to those of the Boca soils. Copeland soils have an argillic horizon within a depth of 20 inches and limestone bedrock at a depth of 20 to 50 inches. Hallandale soils have limestone bedrock at a depth of 7 to 20 inches. They do not have an argillic horizon. Jupiter soils have limestone at a depth of 10 to 20 inches, and they have a mollic epipedon. Malabar soils have an argillic horizon at a depth of 40 to 70 inches. Riviera soils have an argillic horizon at a depth of 20 to 40 inches.

Typical pedon of Boca fine sand, about 1,400 feet south and 4,100 feet east of the northwest corner of sec. 16, T. 9 S., R. 28 E.

A—0 to 4 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

E—4 to 18 inches; light gray (10YR 6/1) fine sand; common medium to coarse faint splotches of light gray (10YR 7/1) and very pale brown (10YR 7/3) at a depth of about 9 inches; single grained; loose; few medium roots; moderately acid; clear wavy boundary.

EB—18 to 26 inches; brown (10YR 5/3) fine sand; single grained; loose; moderately acid; clear wavy boundary.

Btg—26 to 30 inches; dark grayish brown (10YR 4/2) fine sandy loam; common fine distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; slightly alkaline; abrupt irregular boundary.

R—30 inches; limestone bedrock.

The thickness of the solum and depth to limestone bedrock ranges from 24 to 40 inches. In some pedons, cavities make up about 20 percent of the limestone bedrock to a depth of 50 inches or more. The depth to an argillic horizon is highly variable, but it ranges from 20 to 36 inches in most pedons.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. If the A horizon has value of less than 3.5, it is less than 6 inches thick. Reaction is strongly acid to moderately alkaline.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4. Texture is sand or fine sand. Reaction is strongly acid to moderately alkaline. The E horizon has common or many, medium to coarse faint splotches that have chroma of 1 and 3 and are at a depth of 6 to 18 inches. The E horizon is 14 to 20 inches thick.

If it occurs, the EB horizon has hue of 10YR, value of 3 to 7, and chroma of 2 to 8. Texture is fine sand or loamy fine sand. Some pedons have brown, yellow, or gray

mottles. Reaction ranges from strongly acid to moderately alkaline.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. Texture is fine sandy loam or sandy clay loam with pockets or lenses of sand or loamy sand. Some pedons have gray, yellow, or brown mottles. Reaction ranges from strongly acid to moderately alkaline. The Btg horizon is 4 to 20 inches thick.

Many pedons have a layer between the Btg horizon and the limestone bedrock that is about 1 to 3 inches thick and is composed of mixed weathered and soft limestone fragments, masses of carbonate, sandy clay loam, or sandy loam.

Canaveral Series

The Canaveral series consists of nearly level, moderately well drained soils on the lower ridges adjacent to the beaches along the Gulf Coast. These soils formed in marine deposits of sand and shell fragments. The slopes are less than 2 percent. These soils are hyperthermic, uncoated Aquic Quartzipsamments.

Canaveral soils are closely associated with Beaches. Beaches are flooded by daily tides and are unstable.

Typical pedon of Canaveral fine sand, in an area of Canaveral-Beaches complex; about 5,000 feet west and 100 feet north of the southeast corner of sec. 8, T. 48 S., R. 25 E.

A—0 to 4 inches; dark brown (10YR 4/3) fine sand; single grained; loose; many very fine, fine, medium, and coarse roots; about 5 percent, by volume, shell fragments; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C1—4 to 8 inches; brown (10YR 5/3) fine sand; single grained; loose; few fine and medium roots; about 10 percent shell fragments; slightly effervescent; moderately alkaline; clear wavy boundary.

C2—8 to 35 inches; pale brown (10YR 6/3) fine sand; single grained; loose; about 5 to 25 percent, by volume, shell fragments in stratified layers; slightly effervescent; moderately alkaline; gradual wavy boundary.

C3—35 to 70 inches; light gray (10YR 7/1) fine sand mixed with about 40 percent multicolored, dominantly sand-sized shell fragments; common medium distinct white (10YR 8/1) streaks; single grained; loose; slightly effervescent; moderately alkaline.

Canaveral soils are slightly alkaline or moderately alkaline in all horizons.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It has 5 to 10 percent, by volume, shell fragments. The thickness of the A horizon ranges from 4 to 10 inches.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. It is a mixture of fine sand and multicolored shell fragments. In some pedons, the C horizon consists of stratified sand and shell fragments. The content, by volume, of shell fragments that are dominantly sand-sized ranges from about 10 to 60 percent. The content, by volume, of shell fragments is less than 15 percent in the control section.

Chobee Series

The Chobee series consists of level, very poorly drained soils in swamps and marshes. These soils formed in thick beds of loamy marine sediments. The slopes are less than 1 percent. These soils are fine-loamy, siliceous, hyperthermic Typic Argiaquolls.

Chobee soils are closely associated with Gator, Holopaw, Riviera, and Winder soils on similar landforms. Gator soils have an organic layer more than 16 inches thick. Winder soils do not have a mollic epipedon. Holopaw soils have an argillic horizon at a depth of more than 40 inches. Riviera soils have an argillic horizon at a depth of 20 to 40 inches.

Typical pedon of Chobee fine sandy loam, in an area of Chobee, Winder, and Gator soils, depressional; about 2,500 feet south and 2,500 feet west of the northeast corner of sec. 1, T. 46 S., R. 30 E.

A—0 to 13 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; friable; many fine and very fine roots; moderately acid; clear wavy boundary.

Btg1—13 to 22 inches; dark gray (10YR 4/1) sandy clay loam; few fine prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; slightly acid; clear wavy boundary.

Btg2—22 to 37 inches; gray (10YR 5/1) sandy clay loam; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; slightly acid; clear wavy boundary.

Btg3—37 to 47 inches; gray (10YR 5/1) sandy clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; neutral; sand grains coated and bridged with clay; clear wavy boundary.

Cg1—47 to 62 inches; dark greenish gray (5GY 5/1) loamy fine sand; massive; slightly alkaline; clear wavy boundary.

Cg2—62 to 80 inches; gray (5Y 6/1) loamy fine sand; massive; slightly effervescent; moderately alkaline; about 10 percent, by volume, mostly sand-sized limestone fragments.

The thickness of the solum is more than 40 inches.

Reaction is moderately acid to neutral in the A horizon, slightly acid or neutral in the Btg horizon, and neutral to moderately alkaline in the C horizon. The depth to limestone bedrock is more than 40 inches.

The A horizon has hue of 2.5Y or 10YR, value of 2 or 3, and chroma of 1 or 2 or is neutral in hue and has value of 2 or 3. Some depressions have texture of thin muck or mucky fine sand. The A horizon is 4 to 18 inches thick.

The upper part of the Btg horizon has hue of 10YR to 5Y, value of 2 to 6, and chroma of 1 or 2. Some pedons have mottles. The lower part of the Btg horizon has hue of 10YR to 2.5Y, value of 3 to 6, and chroma of 2. Some pedons have mottles. The texture of the Btg horizon is fine sandy loam or sandy clay loam.

The Cg horizon has hue of 10YR to 5GY, value of 4 to 7, and chroma of 1 or 2. Some pedons have mottles. Texture is loamy sand, loamy fine sand, sandy loam, or fine sandy loam. In most pedons, the Cg horizon has as much as 25 percent calcareous nodules of calcium carbonate that are mostly sand-sized.

Copeland Series

The Copeland series consists of level, poorly drained and very poorly drained soils in sloughs, poorly defined drainageways, marshes, and swamps. These soils formed in sandy and loamy marine sediments overlying limestone. The slopes are less than 1 percent. These soils are fine-loamy, siliceous, hyperthermic Typic Argiaquolls.

The Copeland soils are closely associated with Boca, Holopaw, Pineda, and Riviera soils on similar landforms. Boca, Pineda, and Riviera soils have an argillic horizon at a depth of 20 to 40 inches. Holopaw soils have an argillic horizon at a depth of about 40 inches or more. None of the associated soils have a mollic epipedon.

Typical pedon of Copeland fine sand, in an area of Riviera, limestone substratum-Copeland fine sands; about 2,400 feet west and 1,300 feet south of the northeast corner of sec. 35, T. 46 S., R. 28 E.

A1—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many fine and medium roots; slightly acid; clear smooth boundary.

A2—6 to 14 inches; very dark grayish brown (10YR 3/2) fine sand; weak fine granular structure; friable; many fine and medium roots; slightly acid; gradual wavy boundary.

E—14 to 18 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; friable; many fine and medium roots; slightly acid; gradual wavy boundary.

Btg—18 to 24 inches; light gray (10YR 7/1) sandy clay loam; few fine and medium prominent yellow (10YR 7/8) streaks and mottles; weak fine subangular blocky structure; friable; few fine roots; sand grains coated and bridged with clay; few faint discontinuous clay flows in pores; slightly alkaline; clear irregular boundary.

2C—24 to 30 inches; light gray (10YR 7/2) marl; weak fine granular structure; friable; clay and silt-sized carbonates coating sand grains; strongly effervescent; moderately alkaline; clear irregular boundary.

2R—30 inches; limestone bedrock.

The solum is 20 to 40 inches thick. The depth to limestone bedrock is 20 to 50 inches. Reaction ranges from slightly acid to moderately alkaline.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2 or is neutral in hue and has value of 2 or 3. It is 10 to 20 inches thick.

The E horizon has hue of 10YR and 2.5Y, value of 4 or 5, and chroma of 1 or 2 or is neutral in hue. Many pedons have mottles in shades of yellow or brown. Texture is fine sand, loamy sand, or loamy fine sand. The E horizon is 2 to 6 inches thick.

The Btg horizon has hue of 10YR, value of 2 to 7, and chroma of 1 or 2; has hue of 2.5Y or 5Y, value of 5 to 7, and chroma of 1 or 2; or is neutral in hue and has value of 5 to 7. Texture is sandy clay loam or sandy loam. The content of silt is less than 15 percent. Many pedons have lenses or streaks of sand, loamy sand, or sandy loam. The Btg horizon is 4 to 20 inches thick.

If it occurs, the 2C horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2 or is neutral in hue. It is dominated by clay and silt-sized carbonates that coat the sand grains. It has 5 to 25 percent, by volume, limestone fragments or, in some pedons, shell. The 2C horizon is 0 to 8 inches thick.

Dania Series

The Dania series consists of level, very poorly drained, organic soils in swamps and marshes. These soils formed in thin beds of organic and sandy material that are shallow over limestone. The slopes are less than 1 percent. These soils are euic, hyperthermic, shallow Lithic Medisaprists.

Dania soils are closely associated with Chobee soils in similar landscape positions. Chobee soils do not have limestone within a depth of 20 inches.

Typical pedon of Dania muck, in an area of Chobee, limestone substratum, and Dania mucks, depressional; about 700 feet east and 1,400 feet south of the northwest corner of sec. 11, T. 50 S., R. 28 E.

Oa—0 to 10 inches; black (5YR 2/1) muck; about 10 percent unrubbed fiber; about 2 percent rubbed fiber; moderate medium granular structure; friable; brown (10YR 5/3) sodium pyrophophosphate extract; many medium and fine roots; slightly acid (pH 6.0 in 0.01

molar calcium chloride solution); gradual smooth boundary.

2Cg—10 to 12 inches; light gray (10YR 7/2) loamy fine sand; single grained; loose; about 10 percent, by volume, limestone fragments; slightly effervescent; moderately alkaline; abrupt irregular boundary.

2R—12 inches; hard limestone bedrock.

The depth to limestone bedrock ranges from 8 to 20 inches. The organic material is moderately acid to neutral. The underlying mineral material is neutral to moderately alkaline.

The Oa horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 2 or less. The content of rubbed fiber is less than 5 percent, and the content of unrubbed fiber is less than 15 percent.

The 2Cg horizon has a hue of 10YR, value of 4 to 7, and chroma of 2 or less. Texture is fine sand or loamy fine sand. The content, by volume, of limestone fragments is as much as 15 percent.

Durbin Series

The Durbin series consists of level, very poorly drained organic soils in tidal mangrove swamps. These soils formed in thick layers of organic material over sandy marine sediments. These soils are subject to daily tidal flooding. Slopes are less than 1 percent. These soils are euic, hyperthermic Typic Sulfihemists.

Durbin soils are closely associated with Canaveral, Estero, Peckish, and Wulfert soils. Canaveral soils are somewhat poorly drained, sandy soils that have shell fragments. They are on adjacent, significantly higher landforms than the Durbin soils. Estero and Peckish soils are sandy, mineral soils on similar landforms. Wulfert soils are on similar landforms, but they have an organic layer about 16 to 48 inches thick.

Typical pedon of Durbin muck, in an area of Durbin and Wulfert mucks, frequently flooded; about 900 feet south and 200 feet west of the northeast corner of sec. 20, T. 48 S., R. 25 E.

Oa1—0 to 29 inches; dark reddish brown (5YR 3/2) muck; about 2 percent fiber rubbed; about 5 percent fiber unrubbed; massive; extremely acid; clear wavy boundary.

Oa2—29 to 40 inches; dark reddish brown (5YR 3/2) muck; about 2 percent fiber rubbed; massive; very strongly acid; gradual wavy boundary.

Oa3—40 to 63 inches; black (10YR 2/1) muck; about 5 percent fiber rubbed; massive; very strongly acid; clear wavy boundary.

Cg—63 to 80 inches; dark gray (10YR 4/1) fine sand; single grained; loose; very strongly acid.

The content of sulfur ranges from 0.75 to 3.25 percent in the Oa horizon. The organic material is dominantly sapric. The total thickness of the Oa horizon ranges from 55 to more than 80 inches. Reaction in the Oa horizon ranges from extremely acid to neutral in its natural state and from extremely acid to moderately acid after drying. Reaction in the Cg horizon ranges from extremely acid to moderately alkaline.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2 or is neutral in hue and has value of 2 or 3. The content of mineral material ranges from about 35 to 60 percent.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2 or is neutral in hue and has value of 4 to 6. Texture is sand, fine sand, or loamy fine sand. Some pedons have 5 to 20 percent sand-sized fragments of shell.

Estero Series

The Estero series consists of level, very poorly drained soils that are in frequently flooded tidal marshes along the Gulf Coast. These soils formed in thick beds of sandy marine sediments. The slopes are less than 1 percent. These soils are sandy, siliceous, hyperthermic Typic Haplaquods.

The Estero soils are closely associated with Kesson, Peckish, Pennsuco, and Wulfert soils on similar landforms. Kesson soils are calcareous throughout. Peckish soils are not calcareous. Pennsuco soils have a strongly calcareous silt loam surface layer. They have limestone at a depth of more than 40 inches. Wulfert soils have deposits of organic material that are more than 16 inches thick. None of the associated soils have a spodic horizon.

Typical pedon of Estero muck, in an area of Estero and Peckish soils, frequently flooded; about 2,000 feet south and 300 feet east of the northwest corner of sec. 35, T. 51 S., R. 27 E.

Oa—0 to 6 inches; black (10YR 2/1) sapric muck; less than 10 percent fiber; few fine light gray sand streaks; moderate medium granular structure; very friable; slightly sticky; many fine roots; mild sulfur odor; neutral; clear wavy boundary.

A1—6 to 14 inches; black (10YR 2/1) fine sand; many coarse prominent grayish brown (10YR 5/2) mottles; massive; very friable; slightly sticky; common pockets of mucky fine sand; many fine roots; slightly effervescent; moderately alkaline; mild sulfur odor; gradual diffuse boundary.

A2—14 to 28 inches; black (10YR 2/1) fine sand; many coarse prominent grayish brown (10YR 5/2) mottles; massive; very friable; slightly sticky; common fine

roots; mild sulfur odor; slightly effervescent; moderately alkaline; clear wavy boundary.

Eg—28 to 40 inches; dark grayish brown (10YR 4/2) fine sand; few medium distinct very dark grayish brown (10YR 3/2) mottles; single grained; strong sulfur odor; slightly effervescent; moderately alkaline; clear wavy boundary.

Bh—40 to 62 inches; mixed dark brown (10YR 3/3) and very dark brown (10YR 2/2) fine sand; massive; very friable; nonsticky; strongly acid.

The thickness of solum ranges from 50 to 80 inches or more. Reaction is neutral to moderately alkaline in the Oa, A, and Eg horizons and is strongly acid or very strongly acid in the Bh horizon.

The Oa horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is 6 to 8 inches thick.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2 or is neutral and has value of 2 to 4. Texture is sand or fine sand. The A horizon is 10 to 24 inches thick.

The Eg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Some pedons have mottles. Texture is sand or fine sand. The Eg horizon is 10 to 20 inches thick.

The Bh horizon has hue of 5YR to 10YR, value of 1 to 3, and chroma of 2 or 3. Texture is sand or fine sand.

Estero soils in this survey area are taxadjuncts to the Estero series because they have a thicker A horizon than is defined as the range in characteristics for the series. This difference does not significantly affect the behavior, use, management, or interpretations of the soils. Estero soils in this survey area are sandy, siliceous, hyperthermic Arenic Haplaquods.

Ft. Drum Series

The Ft. Drum series consists of nearly level, poorly drained soils on flatwoods bordering sloughs and depressional areas. These soils formed in sandy marine sediments influenced by calcareous material. The slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Aeric Haplaquepts.

Ft. Drum soils are closely associated with Boca, Immokalee, Malabar, and Oldsmar soils. Boca, Immokalee, and Oldsmar soils are in similar landscape positions on the flatwoods. Boca soils have an argillic horizon and bedrock at a depth of 24 to 40 inches. Immokalee soils have a spodic horizon at a depth of 30 to 50 inches. Oldsmar soils have a spodic horizon at a depth of 30 to 50 inches and an argillic horizon below a depth of 40 inches. Malabar soils are in landscape positions that are similar or are slightly lower than those of the Ft. Drum soils. They have an argillic horizon at a depth of more than 40 inches.

Typical pedon of Ft. Drum fine sand, in an area of Ft. Drum and Malabar, high, fine sands; about 1,600 feet south and 650 feet east of the northwest corner of sec. 5, T. 47 S., R. 28 E.

A1—0 to 3 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

A2—3 to 5 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; common fine and medium roots; strongly acid; gradual smooth boundary.

Bk1—5 to 17 inches; light brownish gray (10YR 6/2) fine sand; common medium faint splotches of light gray (10YR 7/1) and very pale brown (10YR 7/3) at a depth of about 10 inches; weak fine subangular blocky structure parting to moderate fine granular structure; friable; common fine and medium roots; sand grains coated with carbonates; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—17 to 20 inches; light gray (10YR 7/2) and very pale brown (10YR 7/3) fine sand; weak fine granular structure; friable; common fine and medium roots; sand grains coated with carbonates; slightly effervescent; moderately alkaline; gradual wavy boundary.

C1—20 to 37 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few medium roots; slightly alkaline; gradual wavy boundary.

C2—37 to 60 inches; light gray (10YR 7/1) fine sand; single grained; loose; slightly alkaline; gradual wavy boundary.

C3—60 to 80 inches; brown (10YR 5/3) fine sand; single grained; loose; slightly alkaline.

The thickness of the solum ranges from 18 to 40 inches.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. Reaction ranges from strongly acid to neutral. Texture is fine sand or sand. The total thickness of the A horizon is less than 6 inches.

The Bk horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3. Reaction is slightly alkaline or moderately alkaline. Some pedons have carbonate nodules. The Bk horizon has common or many medium to coarse faint splotches that have chroma of 1 and 3 at a depth of 6 to 18 inches. Texture is fine sand, loamy fine sand, or fine sandy loam.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 6. Reaction is slightly acid to moderately alkaline.

Gator Series

The Gator series consists of level, very poorly drained soils in marshes. These soils formed in muck over loamy marine sediments. The slopes are less than 1 percent. These soils are loamy, siliceous, euic, hyperthermic Terric Medisaprists.

The Gator soils are closely associated with Chobee, Pineda, Riviera, and Winder soils. All of the associated soils are mineral soils. Chobee and Winder soils are in landscape positions similar to those of the Gator soils. Chobee soils have a mollic epipedon and an argillic horizon at a depth of 20 inches or less. Pineda and Riviera soils are in sloughs, and they have an argillic horizon at a depth of 20 to 40 inches. Winder soils have an argillic horizon at a depth of 20 inches or less.

Typical pedon of Gator muck, in an area of Chobee, Winder, and Gator soils, depressional; about 1,000 feet north and 400 feet east of the southwest corner of sec. 19, T. 46 S., R. 30 E.

Oa1—0 to 10 inches; black (5YR 2/1) muck; about 15 percent unrubbed fiber; less than 5 percent fiber rubbed; moderate medium granular structure; friable; many fine roots; slightly acid; clear wavy boundary.

Oa2—10 to 25 inches; black (N 2/0) muck; about 15 percent unrubbed fiber; less than 5 percent fiber rubbed; moderate coarse granular structure; friable; slightly acid; clear wavy boundary.

Cg1—25 to 40 inches; very dark gray (10YR 3/1) fine sandy loam; massive; friable; slightly sticky, slightly plastic; neutral; clear wavy boundary.

Cg2—40 to 55 inches; grayish brown (10YR 5/2) fine sandy loam; massive; neutral; clear wavy boundary.

Cg3—55 to 65 inches; greenish gray (5GY 6/1) fine sandy loam; massive; slightly alkaline; clear wavy boundary.

Cg4—65 to 80 inches; light gray (10YR 7/1) fine sandy loam; massive; slightly effervescent; moderately alkaline.

Reaction is extremely acid to slightly acid in the Oa horizon. The reaction in the C horizon ranges from slightly acid to moderately alkaline. The thickness of the organic material ranges from 16 to 51 inches. The depth to loamy material is 20 to 51 inches.

The Oa horizon has hue of 10YR, value of 2, and chroma of 2 or less or is neutral and has value of 2. The content of unrubbed fiber is less than 15 percent, and the content of rubbed fiber is 5 percent or less.

The Cg horizon has hue of 10YR, 5Y, or 5GY; value of 2 to 7; and chroma of 1 or 2. Texture is sandy loam, fine sandy loam, or sandy clay loam. Some pedons have strata of sandier material in the lower part of the Cg horizon. Some pedons have fragments of shell or soft masses of calcium carbonate.

Hallandale Series

The Hallandale series consists of nearly level, poorly drained soils on the flatwoods and in sloughs and poorly defined drainageways. These soils formed in sandy marine sediments overlying limestone. The slopes are less than 2 percent. These soils are siliceous, hyperthermic Lithic Psammaquents.

The Hallandale soils are closely associated with Boca, Jupiter, Pineda, and Riviera soils in similar or slightly lower landscape positions. Boca soils have an argillic horizon and bedrock at a depth of more than 24 inches. Jupiter soils have a mollic epipedon. Pineda and Riviera soils have an argillic horizon at a depth of 20 to 40 inches and limestone at a depth of more than 40 inches.

Typical pedon of Hallandale fine sand, about 1,600 feet north and 400 feet west of the southeast corner of sec. 1, T. 50 S., R. 27 E.

A—0 to 3 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; many medium and fine roots; moderately acid; clear wavy boundary.

E—3 to 9 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine roots; slightly acid; clear wavy boundary.

Bw—9 to 12 inches; yellowish brown (10YR 5/6) fine sand; common medium distinct splotches of white (10YR 8/1) and pale brown (10YR 6/3); single grained; loose; neutral; abrupt irregular boundary.

R—12 inches; hard, fractured limestone that can be excavated with power equipment.

The thickness of the solum and the depth to bedrock range from 7 to 20 inches, although fractures and solution holes can extend to a depth of 50 inches or more in many pedons.

The A or Ap horizon has hue of 10YR, value of 2 to 6, and chroma of 1 or 2. Reaction is strongly acid to neutral. The thickness of the A horizon ranges from 2 to 7 inches.

The E horizon, if it occurs, has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. It has common or many medium to coarse faint splotches that have chroma of 1 and 3 at a depth of 6 to 18 inches. Texture is sand or fine sand. Reaction ranges from strongly acid to neutral. The thickness of the E horizon ranges from 0 to 8 inches.

The Bw horizon, if it occurs, has hue of 10YR, value of 5 to 7, and chroma of 3 to 6. Texture is sand or fine sand. Reaction is moderately acid to moderately alkaline. The thickness of the Bw horizon ranges from 0 to 15 inches.

The Cg horizon, if it occurs, is between the A horizon and the limestone bedrock. It has hue of 10YR, value of 4 to 8, and chroma of 1 to 4. Texture is fine sand or sand.

Hilolo Series

The Hilolo series consists of nearly level, poorly drained soils on hammocks. These soils formed in sandy and loamy marine sediments influenced by underlying alkaline materials. The slopes are less than 2 percent. These soils are fine-loamy, siliceous, hyperthermic Mollic Ochraqualfs.

The Hilolo soils are closely associated with Jupiter, Margate, and Pineda soils in similar landscape positions. Jupiter soils have limestone bedrock within a depth of 20 inches. Margate soils do not have an argillic horizon, and they have limestone bedrock at a depth of 20 to 40 inches. Pineda soils have an argillic horizon at a depth of 20 to 40 inches, are noncalcareous, and have limestone at a depth of more than 40 inches.

Typical pedon of Hilolo fine sand, in an area of Hilolo, Jupiter, and Margate fine sands; about 2,000 feet east and 220 feet north of the southwest corner of sec. 15, T. 46 S., R. 30 E.

A1—0 to 4 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many fine and very fine roots and few medium roots; few pieces of organic matter; slightly alkaline; clear wavy boundary.

A2—4 to 9 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; common fine and very fine roots; slightly alkaline; clear wavy boundary.

Eg—9 to 12 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; few fine roots; slightly alkaline; gradual wavy boundary.

Btkg1—12 to 20 inches; light brownish gray (10YR 6/2) fine sandy loam; weak fine granular structure; slightly sticky, nonplastic; sand grains coated and bridged with clay; moderately alkaline (calcareous); gradual wavy boundary.

Btkg2—20 to 35 inches; light gray (10YR 7/2) sandy clay loam; weak medium subangular blocky structure; slightly sticky, slightly plastic; sand grains coated and bridged with clay; moderately alkaline (calcareous); gradual wavy boundary.

Btkg3—35 to 45 inches; light gray (5Y 7/1) fine sandy loam; weak medium subangular blocky structure; slightly sticky, nonplastic; sand grains coated and bridged with clay; moderately alkaline (calcareous); gradual wavy boundary.

BCg—45 to 50 inches; gray (5Y 6/1) fine sandy loam; massive; slightly sticky, nonplastic; moderately alkaline (calcareous); gradual wavy boundary.

Cg—50 to 61 inches; light olive gray (5Y 6/2) loamy fine sand; massive; slightly sticky and nonplastic; moderately alkaline (calcareous); abrupt irregular boundary.

2R—61 inches; hard limestone bedrock.

The thickness of the solum ranges from 40 to 60 inches. The depth to limestone bedrock is more than 40 inches.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. Texture is generally sand, fine sand, loamy sand, or loamy fine sand; the upper few inches, however, is fine sand. Reaction ranges from neutral to moderately alkaline. The thickness of the A horizon ranges from 7 to 9 inches.

The Eg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2 or is neutral and has value of 4 to 6. The thickness of the Eg horizon ranges from 0 to 4 inches.

The Btkg horizon has hue of 10YR to 5Y, value of 4 to 8, and chroma of 1 or 2. Texture is sandy loam, fine sandy loam, or sandy clay loam. The weighted content of clay in the upper 20 inches of the control section ranges from 18 to 35 percent. Reaction is slightly alkaline or moderately alkaline.

The Cg horizon has hue of 10YR, 2.5Y, 5Y, 5GY, or 5BG; value of 5 or 6; and chroma of 2 or less. Texture ranges from sand to fine sandy loam. Some pedons have shells or shell fragments. Reaction ranges from slightly alkaline to strongly alkaline.

The 2R horizon consists of limestone bedrock.

Holopaw Series

The Holopaw series consists of level and nearly level, poorly drained and very poorly drained soils in sloughs, poorly defined drainageways, and marshes. These soils formed in sandy and loamy marine sediments. The slopes are less than 2 percent. These soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

Holopaw soils are closely associated with Basinger, Okeelanta, Pineda, and Riviera soils in similar landscape positions. Basinger soils do not have an argillic horizon. Okeelanta soils have a organic layer more than 16 inches thick. Pineda and Riviera soils have an argillic horizon at a depth of 20 to 40 inches.

Typical pedon of Holopaw fine sand, limestone substratum, about 1,800 feet east and 700 feet south of the northwest corner of sec. 2, T. 49 S., R. 26 E.

A—0 to 5 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine roots; moderately acid; clear wavy boundary.

Eg1—5 to 29 inches; white (10YR 8/2) fine sand; common medium faint very pale brown (10YR 7/3) splotches; common fine prominent black (10YR 2/1) organic areas; single grained; loose; few fine roots; slightly acid; clear wavy boundary.

Eg2—29 to 52 inches; light gray (10YR 7/2) fine sand; single grained; loose; slightly acid; clear wavy boundary.

Eg3—52 to 57 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; neutral; abrupt wavy boundary.
Btg—57 to 62 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; slightly alkaline; abrupt wavy boundary.
R—62 inches; hard limestone.

The thickness of the solum ranges from 50 to 80 inches or more. Some pedons have a thin surface of muck. Reaction ranges from strongly acid to neutral in the surface horizons and from strongly acid to moderately alkaline in the other horizons.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 or less. If value is 3 or less, the horizon is less than 6 inches thick.

The Eg horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 3 or less. It has common to many medium or large splotches or few or common fine to medium areas of organic accumulations within a depth of 6 inches. Texture of the Eg horizon is sand or fine sand.

The Btg horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 or less. Texture is sandy loam, fine sandy loam, or sandy clay loam.

The Cg horizon, if it occurs, has hue of 10YR to 5GY, value of 5 to 7, and chroma of 2 or less. Texture is sand, fine sand, loamy sand, or loamy fine sand.

Some pedons have a limestone substratum that is generally at a depth of 50 to 80 inches. Other pedons do not have a limestone substratum.

Immokalee Series

The Immokalee series consists of nearly level, poorly drained soils on the flatwoods. These soils formed in sandy marine sediments. The slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Arenic Haplaquods.

Immokalee soils are closely associated with Basinger, Myakka, Oldsmar, and Riviera soils. Basinger and Riviera soils are in lower positions on the landscape than the Immokalee soils. Basinger soils have a stained layer but do not have a spodic horizon. Riviera soils have an argillic horizon at a depth of 20 to 40 inches. Myakka and Oldsmar soils are in landscape positions similar to those of the Immokalee soils. Myakka soils have a spodic horizon within a depth of 30 inches. Oldsmar soils have a spodic horizon that is underlain by an argillic horizon.

Typical pedon of Immokalee fine sand, about 2,850 feet north and 3,200 feet west of the southeast corner of sec. 20, T. 46 S., R. 29 E.

A—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.
E—6 to 35 inches; light gray (10YR 7/2) fine sand; common medium distinct splotches of white (10YR 8/1) and pale brown (10YR 6/3); single grained; loose; many fine and medium roots; strongly acid; clear wavy boundary.
Bh1—35 to 40 inches; black (10YR 2/1) fine sand; weak medium subangular blocky structure; friable; very strongly acid; clear wavy boundary.
Bh2—40 to 49 inches; dark reddish brown (5YR 3/2) fine sand; weak medium subangular blocky structure; friable; very strongly acid; clear wavy boundary.
BC—49 to 58 inches; dark brown (10YR 4/3) fine sand; single grained; loose; very strongly acid; clear wavy boundary.
C—58 to 80 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; strongly acid.

The thickness of the solum ranges from 40 to 80 inches or more. Reaction ranges from extremely acid to moderately acid throughout. Texture is generally sand or fine sand; however, the surface layer is fine sand.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is 3 to 9 inches thick.

The E horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2. It has common or many medium to coarse faint splotches that have chroma of 1 and 3 at a depth of 6 to 18 inches. The E horizon is 22 to 47 inches thick.

The Bh horizon has hue of 10YR and 5YR, value of 2 or 3, and chroma of 3 or less. It is 10 to 49 inches thick.

The BC horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4 or has hue of 7.5YR, value of 4, and chroma of 2. It is 4 to 12 inches thick.

Some pedons have a C/Bh horizon that has a matrix color similar to that of the BC horizon, which contains fragments from the overlying Bh horizon.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4.

Jupiter Series

The Jupiter series consists of nearly level, poorly drained and very poorly drained soils on the flatwoods and in hammocks, sloughs, and poorly defined drainageways. These soils formed in sandy marine sediments. The slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Lithic Haplaquolls.

The Jupiter soils are geographically closely associated with the Boca, Hallandale, Hilolo, and Margate soils on similar landforms. Boca soils have an argillic horizon and limestone at a depth of 24 to 40 inches. Hallandale soils

do not have a mollic epipedon. Hilolo soils are calcareous, have an argillic horizon at a depth of less than 10 inches, and have limestone bedrock at a depth of more than 40 inches. Margate soils have limestone at a depth of 20 to 40 inches.

Typical pedon of Jupiter fine sand, in an area of Hilolo, Jupiter, and Margate fine sands; about 500 feet east and 4,500 feet north of the southwest corner of sec. 32, T. 49 S., R. 30 E.

A1—0 to 4 inches; black (10YR 2/1) fine sand; single grained; loose; slightly acid; clear wavy boundary.
A2—4 to 10 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; slightly alkaline; abrupt irregular boundary.
2R—10 inches; hard limestone.

The depth to fractured limestone ranges from 10 to 20 inches. Reaction ranges from slightly acid to moderately alkaline in all horizons. Texture is generally fine sand or sand in all horizons; however, the upper few inches is fine sand or mucky fine sand.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The thickness of the A horizon ranges from 10 to 20 inches.

The C horizon, if it occurs, has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The thickness of the C horizon ranges from 0 to 6 inches.

Kesson Series

The Kesson series consists of level, very poorly drained soils in frequently flooded tidal marshes along the Gulf Coast. These soils formed in thick marine deposits of sand and shell fragments. The slopes are less than 1 percent. These soils are siliceous, hyperthermic Typic Psammaquents.

Kesson soils are closely associated with Estero, Peckish, Pennsuco, and Wulfert soils on similar landforms. Estero soils have a spodic horizon. Peckish soils are noncalcareous. Pennsuco soils have a strongly calcareous silt loam surface layer and have limestone bedrock at a depth of more than 40 inches. Wulfert soils have deposits of organic material more than 16 inches thick.

Typical pedon of Kesson muck, frequently flooded, about 2,500 feet north and 600 feet east of the southwest corner of sec. 13, T. 52 S., R. 28 E.

Oa—0 to 5 inches; black (10YR 2/1) muck; weak medium granular structure; friable; common fine and medium roots; slightly effervescent; moderately alkaline; abrupt wavy boundary.
A—5 to 10 inches; dark gray (10YR 4/1) fine sand; single grained; loose; common fine and medium roots; about 10 percent, by volume, shell fragments; slightly effervescent; moderately alkaline; clear wavy boundary.
C1—10 to 34 inches; gray (10YR 6/1) fine sand; single grained; loose; about 10 percent, by volume, shell fragments; slightly effervescent; moderately alkaline; gradual wavy boundary.
C2—34 to 50 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; about 20 percent, by volume, shell fragments; slightly effervescent; moderately alkaline; gradual wavy boundary.
C3—50 to 80 inches; pale brown (10YR 6/3) fine sand; single grained; loose; about 10 percent, by volume, shell fragments; slightly effervescent; moderately alkaline.

The content of sulfur is more than 0.75 percent within a depth of 20 inches. Reaction is slightly alkaline to strongly alkaline throughout. The calcium carbonate equivalent is more than three times the sulfur content for some portions.

The Oa horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is 3 to 6 inches thick.

The A horizon has hue of 10YR, value of 2 to 6, and chroma of 1 to 3. The content of shell fragments ranges from about 5 to 15 percent. Texture is sand or fine sand. The A horizon is 3 to 7 inches thick.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3. The content of shell fragments ranges from about 5 to 15 percent. Texture is sand or fine sand.

Malabar Series

The Malabar series consists of nearly level, poorly drained soils in sloughs and poorly defined drainageways and on ridges bordering sloughs. These soils formed in sandy over loamy marine sediments. The slopes are less than 2 percent. These soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

The Malabar soils are closely associated with Basinger, Ft. Drum, Oldsmar, and Pineda soils. Basinger and Pineda soils are in landscape positions similar to those of the Malabar soils. Basinger soils do not have an argillic horizon. Pineda soils have an argillic horizon at a depth of 20 to 40 inches. Ft. Drum and Oldsmar soils are in higher positions on the landscape than the Malabar soils. Ft. Drum soils are calcareous. Oldsmar soils have a spodic horizon at a depth of 30 to 50 inches with an argillic horizon underneath.

Typical pedon of Malabar fine sand, about 2,500 feet east and 2,300 feet south of the northwest corner of sec. 2, T. 49 S., R. 26 E.

A—0 to 2 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; slightly acid; clear wavy boundary.

E—2 to 15 inches; light brownish gray (10YR 6/2) fine sand; common medium faint splotches of white (10YR 8/1) and pale brown (10YR 6/3); single grained; loose; many fine and medium roots; moderately acid; clear wavy boundary.
Bw1—15 to 22 inches; brownish yellow (10YR 6/8) fine sand; single grained; loose; few fine roots; moderately acid; clear wavy boundary.
Bw2—22 to 29 inches; yellow (10YR 7/6) fine sand; single grained; loose; few fine roots; moderately acid; clear wavy boundary.
E'1—29 to 40 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; moderately acid; clear wavy boundary.
E'2—40 to 55 inches; light gray (10YR 7/2) fine sand; single grained; loose; slightly acid; clear wavy boundary.
Btg—55 to 72 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; clear wavy boundary.
Cg—72 to 80 inches; light gray (10YR 7/2) fine sand; single grained; loose; about 10 percent, by volume, mostly sand-sized shell fragments; slightly alkaline.

The thickness of the solum is 46 to 90 inches. Reaction ranges from strongly acid to moderately alkaline in all horizons.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is 2 to 8 inches thick.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 2 to 4. It has common or many medium to coarse faint splotches that have chroma of 1 and 3 at a depth of 2 to 12 inches. The E horizon is 2 to 16 inches thick.

The Bw horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8. Texture is sand or fine sand. The Bw horizon is 12 to 26 inches thick.

The E' horizon, if it occurs, has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. Texture is sand or fine sand. It is 10 to 29 inches thick.

The Btg horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2. Texture is sandy loam, fine sandy loam, or sandy clay loam.

The BCg horizon, if it occurs, has colors similar to those of the Btg horizon. Texture is fine sandy loam or loamy fine sand.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Texture is sand or fine sand with pockets, lenses, or stratified layers of loamy material. The content of dominantly sand-sized shell fragments ranges from 0 to 50 percent, by volume.

Margate Series

The Margate series consists of nearly level, poorly drained soils on hammocks. These soils formed in sandy marine sediments. The slopes are less than 2 percent. These soils are siliceous, hyperthermic Mollic Psammaquents.

Margate soils are closely associated with Boca, Hallandale, Hilolo, and Jupiter soils on similar landforms. Boca soils have an argillic horizon and limestone bedrock at a depth of 24 to 40 inches. Hallandale soils have limestone bedrock at a depth of 20 inches or less. Hilolo soils have a argillic horizon and limestone bedrock at a depth of more than 40 inches. Jupiter soils have a mollic epipedon and limestone bedrock at a depth of 7 to 20 inches.

Typical pedon of Margate fine sand, in an area of Hilolo, Jupiter, and Margate fine sands; about 530 feet east and 4,550 feet north of the southwest corner of sec. 32, T. 49 S., R. 30 E.

A—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many medium and fine roots; moderately acid; clear smooth boundary.
E—6 to 17 inches; light brownish gray (10YR 6/2) fine sand; common medium faint splotches of white (10YR 8/1) and pale brown (10YR 6/3); single grained; loose; many medium and fine roots; moderately acid; gradual wavy boundary.
Bw1—17 to 29 inches; brown (10YR 5/3) fine sand; single grained; loose; few fine roots; neutral; gradual wavy boundary.
Bw2—29 to 35 inches; brown (10YR 4/3) fine sand; single grained; loose; some sand grains partially coated; slightly alkaline; abrupt irregular boundary.
2R—35 inches; hard limestone.

The thickness of the solum and the depth to limestone range from 20 to 40 inches, although some solution holes are as much as 60 inches deep in some pedons.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. Reaction is very strongly acid or moderately acid. The thickness of the A horizon ranges from 6 to 10 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 4. It has common or many medium to coarse faint splotches that have chroma of 1 and 3 at a depth of 2 to 12 inches. Reaction in the E horizon ranges from strongly acid to slightly acid. Texture is sand or fine sand.

The upper part of the Bw horizon has hue of 10YR, value of 3 to 6, and chroma of 1 to 3. The lower part of the Bw horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. Reaction in the Bw horizon

ranges from slightly acid to slightly alkaline. Texture is sand or fine sand.

The C horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. Texture is variable, ranging from fine sand to sandy clay loam and is mixed with limestone fragments or soft carbonate material. The thickness of the C horizon ranges from 0 to 5 inches.

The 2Ab horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. Texture is sand or fine sand.

The 2Eb horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 4. Texture is sand or fine sand.

The 2Btb horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 4. Texture is fine sandy loam or sandy clay loam.

Matlacha Series

The Matlacha series consists of nearly level, somewhat poorly drained soils that were formed by fill material. The soils formed in areas that have been prepared for urban development. The slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Alfic Udarents.

Matlacha soils are closely associated with areas of Urban land.

Typical pedon of Matlacha gravelly fine sand, in an area of Urban land-Matlacha-Boca complex; about 1,250 feet south and 1,100 feet east of the northwest corner of sec. 35, T. 49 S., R. 26 E.

C—0 to 21 inches; mixed dark brown (10YR 4/3) and light brownish gray (10YR 6/2) gravelly fine sand; few grayish brown (2.5Y 5/2) loamy textured lenses; massive; friable; about 25 percent shell and limestone fragments; moderately alkaline; abrupt wavy boundary.

Ab—21 to 24 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; neutral; clear wavy boundary.

Eb—24 to 51 inches; light gray (10YR 7/2) fine sand; single grained; loose; slightly acid; clear wavy boundary.

2Btb—51 to 54 inches; pale brown (10YR 6/3) fine sandy loam; weak medium subangular blocky structure; massive; slightly alkaline; clear wavy boundary.

3R—54 inches; limestone.

Reaction ranges from moderately acid to moderately alkaline in the fill material and from moderately acid to neutral in the 2Ab and 2Eb horizons. The thickness of the fill material ranges from 20 to 48 inches. The depth to limestone bedrock is 40 to 60 inches or more.

The C horizon has hue of 10YR, value of 2 to 7, and chroma of 1 to 6; hue of 2.5Y, value of 4 to 6, and chroma of 2 or 4; or hue of 5GY, value of 5, and chroma of 1. The matrix is a mixture of gravelly fine sand and sandy soil material with a few lenses of loamy sand or fine sandy loam throughout. The content of shell and rock fragments less than 3 inches in diameter ranges from about 15 to 30 percent. Some pedons may have up to 15 percent coarse fragments more than 3 inches in diameter. The C horizon has few or common fragments of albic, histic, mollic, or umbric epipedons or an argillic or spodic horizon.

Myakka Series

The Myakka series consists of nearly level, poorly drained soils on the flatwoods. These soils formed in sandy marine sediments. The slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Aeric Haplaquods.

The Myakka soils are closely associated with Basinger, Immokalee, Malabar, and Oldsmar soils. Basinger soils are in lower positions on the landscape than the Myakka soils. They do not have a spodic horizon. Immokalee soils have a spodic horizon at a depth of 30 to 50 inches. Malabar soils have an argillic horizon at a depth of 40 to 70 inches. Oldsmar soils have a spodic horizon at a depth of 30 to 50 inches and an argillic horizon underlying the spodic horizon.

Typical pedon of Myakka fine sand, about 1,000 east and 3,000 feet south of the northwest corner of sec. 1, T. 49 S., R. 26 E.

A—0 to 7 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; friable; many fine roots; strongly acid; clear wavy boundary.

E1—7 to 19 inches; light gray (10YR 7/1 fine sand; common medium distinct splotches of white (10YR 8/2) and pale brown (10YR 6/3); single grained; loose; strongly acid; clear wavy boundary.

E2—19 to 27 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct splotches of white (10YR 8/1) and pale brown (10YR 6/3); single grained; loose; strongly acid; clear wavy boundary.

Bh—27 to 35 inches; black (10YR 2/1) fine sand; weak coarse subangular blocky structure; friable; very strongly acid; clear wavy boundary.

BC—35 to 48 inches; brown (10YR 5/3) fine sand; single grained; loose; strongly acid; clear wavy boundary.

C—48 to 80 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; strongly acid.

The thickness of the solum is more than 40 inches. Reaction ranges from extremely acid to slightly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or is neutral and has value of 2 to 4.

The E horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2. It has common or many medium to coarse faint splotches that have chroma of 1 and 3 at a depth of 6 to 18 inches. Texture of the E horizon is sand or

fine sand. The horizon is 12 to 25 inches thick. Some pedons have a transitional EB horizon that is 1/2 inch to 2 inches thick.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. Texture is sand, fine sand, loamy sand or loamy fine sand. The horizon is 6 to 24 inches thick.

Some pedons have a Bh/BC horizon. The Bh part has the same colors described for the Bh horizon. The BC part has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 or 4. Some pedons only have a BC horizon.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4.

Ochopee Series

The Ochopee series consists of level and nearly level, poorly drained soils on the low prairies and in wetland hardwood areas. These soils formed in calcareous, loamy marine deposits. The slopes are less than 2 percent. These soils are loamy, siliceous (calcareous), hyperthermic, Lithic Haplaquepts.

Ochopee soils are closely associated with Boca, Hallandale, and Jupiter soils on similar landforms. None of these soils have a continuous calcareous solum. Boca soils have an argillic horizon and limestone bedrock at a depth of 24 to 40 inches. Hallandale soils have a sandy texture. Jupiter soils have dark surface layers that extend to the limestone bedrock.

Typical pedon of Ochopee fine sandy loam, low, about 200 feet west and 600 feet north of the southeast corner of sec. 19, R. 30 E., T. 50 S.

A—0 to 5 inches; very dark gray (10YR 3/1) fine sandy loam; weak fine granular structure; friable; slightly sticky, slightly plastic; many fine and very fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk—5 to 17 inches; dark gray (10YR 4/1) fine sandy loam; weak medium subangular blocky structure parting to moderate fine granular; friable; slightly sticky, slightly plastic; sand grains coated with calcium carbonate; violently effervescent; strongly alkaline; clear smooth boundary.

2R—17 inches; limestone.

The thickness of the solum and the depth to limestone range from 6 to 20 inches. Reaction is moderately alkaline or strongly alkaline. Texture is fine sandy loam. The carbonate-free texture is fine sand.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness ranges from 4 to 6 inches.

The Bk horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or less.

The color of the A horizon is darker than that defined as the range in characteristics of the Ochopee series. This difference, however, does not alter the behavior of the soils.

Okeelanta Series

The Okeelanta series consists of level, very poorly drained soils in depressions and marshes. These soils formed in organic materials over sandy marine sediments. The slopes are less than 1 percent. These soils are sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists.

Okeelanta soils are closely associated with Chobee, Gator, Holopaw, and Riviera soils on similar landforms. Chobee, Holopaw, and Riviera soils are mineral soils. Gator soils have a loamy substratum.

Typical pedon of Okeelanta muck, in an area of Holopaw and Okeelanta soils, depressional; about 1,055 feet north and 1,100 feet east of the southwest corner of sec. 26, T. 47 S., R. 28 E.

Oa1—0 to 10 inches; black (5YR 2/1) muck; about 5 percent rubbed fiber; weak medium granular structure; friable; many fine and very fine roots; about 10 percent mineral content; moderately acid; clear smooth boundary.

Oa2—10 to 20 inches; dark reddish brown (5YR 2.5/2) muck; about 5 percent rubbed fiber; massive; friable; many fine roots; about 15 percent mineral content; slightly acid; clear smooth boundary.

Cg1—20 to 52 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; slightly alkaline; clear wavy boundary.

Cg2—52 to 80 inches; light brownish gray (10YR 6/2) loamy fine sand; single grained; loose; many fine and medium shell fragments; moderately alkaline.

The thickness of the organic material ranges from 16 to 50 inches. Reaction ranges from moderately acid to moderately alkaline in the organic material.

The Oa horizon has hue of 10YR or 5YR, value of 2 to 4, and chroma of 1 or 2. The mineral content ranges from about 10 to 40 percent. The content of unrubbed fiber is less than 15 percent.

The Cg horizon has hue of 10YR, value of 3 to 7, and chroma of 1 or 2. Texture is fine sand or loamy fine sand. It has common fine and medium shell fragments.

Oldsmar Series

The Oldsmar series consists of nearly level, poorly drained soils on the flatwoods. These soils formed in sandy over loamy marine sediments, some of which are underlain by limestone. The slopes are less than 2

percent. These soils are sandy, siliceous, hyperthermic Alfic Arenic Haplaquods.

The Oldsmar soils are closely associated with Basinger, Boca, Hallandale, Holopaw, Immokalee, Pineda, and Riviera soils. Basinger, Holopaw, Pineda, and Riviera soils are in lower positions on the landscape than the Oldsmar soils. Basinger soils are sandy throughout. Holopaw soils do not have a spodic horizon. Pineda and Riviera soils have an argillic horizon at a depth of 20 to 40 inches. Boca soils have limestone bedrock and an argillic horizon at a depth of 24 to 40 inches. Immokalee soils are sandy throughout. Hallandale soils have limestone bedrock at a depth of 7 to 20 inches.

Typical pedon of Oldsmar fine sand, about 1,000 feet north and 150 feet west of the southeast corner of sec. 10, R. 27 E., T. 49 S.

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; very friable; many fine roots; very strongly acid; clear wavy boundary.

E1—4 to 20 inches; light gray (10YR 7/1) fine sand; common medium distinct splotches of white (10YR 8/2) and pale brown (10YR 6/3) at a depth of about 9 inches; single grained; loose; few fine roots; very strongly acid; clear wavy boundary.

E2—20 to 35 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct splotches of white (10YR 8/2) and pale brown (10YR 6/3); single grained; loose; very strongly acid; gradual wavy boundary.

Bh1—35 to 45 inches; black (10YR 2/1) fine sand; weak coarse subangular blocky structure; friable; very strongly acid; clear wavy boundary.

Bh2—45 to 50 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; very strongly acid; clear wavy boundary.

Btg—50 to 80 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; slightly acid.

The thickness of the solum ranges from 60 to 80 inches.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. It is 3 to 8 inches thick.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Some pedons are mottled. The horizon has common or many medium to coarse faint or distinct splotches that have chroma of 1 and 3 at a depth of 6 to 18 inches. Many pedons have a transitional horizon at the base of the E horizon. The texture of the E horizon is sand or fine sand. The horizon is 22 to 47 inches thick.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. Texture is sand or fine sand. It is 6 to 20 inches thick.

The Btg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4. Texture is sandy clay loam, sandy loam, or fine sandy loam. Reaction ranges from strongly acid to moderately alkaline. In some pedons, the lower part of the Bt horizon has accumulations of secondary carbonate nodules. Many pedons have a weakly expressed, sandy E' or BE horizon between the Bh and Bt horizons. Depth to the Bt horizon ranges from 40 to 70 inches.

Some pedons have limestone bedrock at a depth of 60 to 72 inches.

Paola Series

The Paola series consists of nearly level to gently rolling, excessively drained soils on coastal dunes. These soils formed in sandy marine sediments. The slopes are 1 to 8 percent. These soils are hyperthermic, uncoated Spodic Quartzipsamments.

The Paola soils are closely associated with Durbin and Wulfert soils. Both of these soils are organic and are subject to daily tidal flooding.

Typical pedon of Paola fine sand, gently rolling, about 2,000 feet west and 300 feet south of the northeast corner of sec. 15, T. 52 S., R. 26 E.

A—0 to 3 inches; gray (10YR 5/1) fine sand; single grained; loose; many fine and very fine roots; very strongly acid; clear wavy boundary.

E—3 to 32 inches; white (10YR 8/1) fine sand; single grained; loose; common fine and very fine roots; very strongly acid; clear wavy boundary.

Bw—32 to 45 inches; yellowish brown (10YR 5/8) fine sand; single grained; loose; few fine roots; strongly acid; gradual wavy boundary.

C1—45 to 68 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; strongly acid; gradual wavy boundary.

C2—68 to 80 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; strongly acid.

The thickness of the solum ranges from 40 to 70 inches. Reaction ranges from very strongly acid to neutral. Texture is sand or fine sand.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1.

The Bw horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8. Some pedons have tongues filled with E material.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 8.

Peckish Series

The Peckish series consists of level, very poorly drained soils in frequently flooded tidal marshes along the Gulf Coast. These soils formed in thick beds of sandy marine sediments. The slopes are less than 1 percent. These soils are sandy, siliceous, hyperthermic Typic Sulfaquents.

Peckish soils are closely associated with Estero, Kesson, Pennsuco, and Wulfert soils on similar landforms. Estero soils have a mucky surface. Kesson soils are calcareous throughout. Pennsuco soils have a strong calcareous silt loam surface thicker than 40 inches and limestone at a depth of more than 40 inches. Wulfert soils have deposits of organic material more than 16 inches thick.

Typical pedon of Peckish mucky fine sand, in an area of Estero and Peckish soils, frequently flooded; about 280 feet north and 650 feet east of the southwest corner of sec. 36, T. 51 S., R. 27 E.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) mucky fine sand; single grained; loose; friable; many fine roots; strongly acid; abrupt smooth boundary.

Eg—9 to 37 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many fine roots; strongly acid; clear smooth boundary.

Bh—37 to 42 inches; dark brown (10YR 4/3) fine sand; single grained; friable; strongly acid; clear smooth boundary.

Cg—42 to 80 inches; light brownish gray (10YR 6/2) fine sand; single grained; strongly acid.

The content of sulfur ranges from 2 to 45 percent within a depth of 20 inches. Reaction ranges from very strongly acid to moderately alkaline in the natural state and from extremely acid to neutral after drying.

The A horizon has hue of 10YR, value of 2, and chroma of 1 or has value of 3 or 4 and chroma of 1 to 3. It is 6 to 10 inches thick.

The Eg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Texture is sand or fine sand. The horizon is 20 to 40 inches thick.

The Bh horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. Texture is sand or fine sand. The horizon is 5 to 7 inches thick.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. Some pedons have shell fragments. Texture is sand or fine sand.

Pennsuco Series

The Pennsuco series consists of level, poorly drained soils on low prairies. These soils formed in marl and finely divided, stratified, calcareous sediments that were deposited in marine or freshwater over limestone. The slopes are less than 1 percent. These soils are coarse-silty, carbonate, hyperthermic Typic Fluvaquents.

The Pennsuco soils are closely associated with Boca, Hallandale, Jupiter, and Ochopee soils in slightly higher or similar landscape positions. Boca soils have an argillic horizon and limestone bedrock at a depth of 24 to 40 inches. Hallandale and Jupiter soils are sandy, and they have limestone within a depth of 20 inches. Ochopee soils are loamy, and they have limestone bedrock within a depth of 20 inches.

Typical pedon of Pennsuco silt loam, about 2,500 feet east and 700 feet south of the northwest corner of sec. 29, T. 51 S., R. 28 E.

A—0 to 5 inches; very dark gray (10YR 3/1) silt loam; weak medium granular structure; friable; many very fine and fine roots; few small shells; strongly effervescent; moderately alkaline; clear wavy boundary.

Bw1—5 to 23 inches; dark gray (10YR 4/1) silt loam; moderate coarse subangular blocky structure; slightly sticky, nonplastic; many fine and very fine roots; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bw2—23 to 40 inches; dark gray (10YR 4/1) silt loam; moderate coarse subangular blocky structure; friable; slightly effervescent; slightly alkaline; clear wavy boundary.

2C—40 to 48 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; slightly effervescent; slightly alkaline; abrupt irregular boundary.

3R—48 inches; limestone.

The depth to limestone ranges from 40 to 72 inches. Reaction is moderately alkaline in the A and B horizons and ranges from neutral to moderately alkaline in the 2C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 2 or less. It is 2 to 10 inches thick.

The Bw horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 4. Texture is silt loam or silt. The horizon is 10 to 30 inches thick.

Some pedons have a C horizon. Texture is silt loam or silt.

The 2C horizon, if it occurs, has hue of 10YR, value of 2 to 5, and chroma of 2 or less. Texture is fine sand or loamy fine sand.

Pineda Series

The Pineda series consists of nearly level, poorly drained soils in sloughs and poorly defined drainageways. These soils formed in sandy over loamy marine sediments. The slopes are less than 2 percent. These

soils are loamy, siliceous, hyperthermic Arenic Glossaqualfs.

The Pineda soils are closely associated with Holopaw, Immokalee, Malabar, and Riviera soils. Holopaw soils have an argillic horizon at a depth of 40 to 70 inches. Immokalee soils are in higher positions on the landscape than the Pineda soils, and they have a spodic horizon at a depth of 30 to 50 inches. Malabar and Riviera are in landscape positions similar to those of the Pineda soils. Malabar soils have an argillic horizon at a depth of 40 to 70 inches. Riviera soils do not have the bright colors of the Pineda soils.

Typical pedon of Pineda fine sand, limestone substratum, about 3,000 feet east and 1,350 feet north of the southwest corner of sec. 6, T. 49 S., R. 27 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

E—4 to 12 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct splotches of white (10YR 8/2) and pale brown (10YR 6/3); single grained; loose; many fine and medium roots; strongly acid; clear wavy boundary.

Bw—12 to 18 inches; brownish yellow (10YR 6/6) fine sand; common medium distinct splotches of white (10YR 8/2) and pale brown (10YR 6/3); single grained; loose; few fine roots; strongly acid; clear wavy boundary.

E'—18 to 30 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; moderately acid; abrupt irregular boundary.

Btg1—30 to 38 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; few tongues of light gray (10YR 7/2) fine sand; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; slightly acid; clear wavy boundary.

Btg2—38 to 45 inches; light brownish gray (10YR 6/2) fine sandy loam; weak coarse subangular blocky structure; friable; neutral; sand grains coated and bridged with clay; clear wavy boundary.

Btg3—45 to 55 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak coarse subangular blocky structure; friable; slightly alkaline; abrupt wavy boundary.

R—55 inches; limestone bedrock.

The thickness of the solum is 40 to 70 inches. The depth to limestone bedrock is 40 to 80 inches. The depth to the Bt horizon is 20 to 40 inches. Reaction ranges from very strongly acid to neutral in the A, E, and Bw horizons, from strongly acid to moderately alkaline in the Btg horizon, and from moderately acid to moderately alkaline in the Cg horizon.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3. It has common or many medium to coarse faint or distinct splotches that have chroma of 1 and 3 at a depth of 6 to 18 inches. The texture of the E horizon is sand or fine sand.

The Bw horizon has hue of 10YR, value of 4 to 8, and chroma of 3 to 8. Texture is sand or fine sand.

The E' horizon has hue of 10YR, value of 5 to 8, and chroma of 2 to 4. Texture is sand or fine sand.

The Btg horizon has vertical sandy tongues from the overlying horizon. The Btg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Texture is sandy loam, fine sandy loam, or sandy clay loam.

The Cg horizon, if it occurs, has hue of 10YR to 5GY, value of 5 to 8, and chroma of 1 or 2. Texture is fine sand or fine sandy loam. In some areas the horizon consists of sand mixed with shells or limestone gravel.

The limestone bedrock commonly starts at a depth of 40 to 70 inches. Some pedons do not have limestone within a depth of 80 inches.

Pomello Series

The Pomello series consists of nearly level, moderately well drained soils on low ridges on the flatwoods. These soils formed in sandy marine sediments. The slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Arenic Haplohumods.

The Pomello soils are closely associated with Basinger, Immokalee, Myakka, and Oldsmar soils on the lower landforms. All of these soils are in lower positions on the landscape, and they are poorly drained.

Typical pedon of Pomello fine sand, about 2,600 feet south and 600 feet east of the northwest corner of sec. 28, T. 46 S., R. 29 E.

A—0 to 4 inches; gray (10YR 5/1) fine sand; weak fine granular structure; very friable; strongly acid; clear wavy boundary.

E1—4 to 19 inches; light gray (10YR 7/1) fine sand; single grained; loose; very strongly acid; clear wavy boundary.

E2—19 to 35 inches; white (10YR 8/1) fine sand; common fine prominent reddish yellow mottles at a depth of about 24 inches; single grained; loose; very strongly acid; clear wavy boundary.

Bh1—35 to 42 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; very strongly acid; clear wavy boundary.

Bh2—42 to 47 inches; dark brown (7.5YR 3/2) fine sand; weak fine granular structure; friable; very strongly acid; clear wavy boundary.

BC—47 to 60 inches; black (7.5YR 4/4) fine sand; single grained; loose; very strongly acid; clear wavy boundary.
C1—60 to 72 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; very strongly acid; clear wavy boundary.
C2—72 to 80 inches; brown (10YR 5/3) fine sand; single grained; loose; very strongly acid.

The solum ranges from 60 to 80 inches or more. Reaction is very strongly acid or moderately acid. Texture is generally sand or fine sand; however, the surface layer is fine sand.

The A horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. It is 2 to 5 inches thick.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Most pedons have few or common distinct or prominent mottles at a depth of 24 to 40 inches. The E horizon is 28 to 45 inches thick.

The Bh horizon has hue of 7.5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. The Bh horizon is weakly cemented in parts of some pedons. It is 6 to 15 inches thick.

Some pedons have a Bh/C horizon that has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. This horizon has common weakly cemented Bh fragments.

The BC horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 3 or 4.

The C horizon, if it occurs, has hue of 10YR, value of 5 to 7, and chroma of 1 to 4.

Riviera Series

The Riviera series consists of level and nearly level, poorly drained and very poorly drained soils in sloughs; broad, poorly defined drainageways; swamps; and marshes. These soils formed in sandy over loamy marine sediments underlain by limestone. The slopes are less than 2 percent. These soils are loamy, siliceous, hyperthermic Arenic Glossaqualfs.

The Riviera soils are closely associated with Boca, Chobee, Copeland, Pineda, and Winder soils on similar landforms. Boca soils have an argillic horizon and limestone at a depth of 24 to 40 inches. Chobee soils have an argillic horizon within a depth of 20 inches. Copeland soils have a mollic epipedon, an argillic horizon within a depth of 20 inches, and limestone bedrock at a depth of 20 to 50 inches. Pineda soils have high-chroma colors in the subsoil. Winder soils have an argillic horizon within a depth of 20 inches, and the horizon extends to a depth of 80 inches or more.

Typical pedon of Riviera fine sand, limestone substratum, about 1,200 feet west and 3,200 feet south of the northeast corner of sec. 3, T. 49 S., R. 27 E.

A—0 to 6 inches; gray (10YR 5/1) fine sand; weak fine granular structure; very friable; many fine roots; strongly acid; clear wavy boundary.
Eg1—6 to 14 inches; light brownish gray (10YR 6/2) fine sand; common medium faint splotches of white (10YR 8/2) and pale brown (10YR 6/3); single grained; loose; few fine roots; moderately acid; gradual wavy boundary.
Eg2—14 to 32 inches; light gray (10YR 7/2) fine sand; common medium faint splotches of white (10YR 8/2) and pale brown (10YR 6/3); single grained; loose; slightly acid; abrupt irregular boundary.
Btg1—32 to 45 inches; grayish brown (10YR 5/2) sandy clay loam; few tongues of light gray (10YR 7/2) fine sand; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; clear wavy boundary.
Btg2—45 to 54 inches; dark gray (10YR 4/1) sandy clay loam; weak coarse subangular blocky structure; sand grains coated and bridged with clay; slightly alkaline; abrupt wavy boundary.
R—54 inches; limestone bedrock.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the combined A and E horizons ranges from 20 to 40 inches. Reaction ranges from very strongly acid to slightly alkaline in the A and Eg horizons and from slightly acid to slightly alkaline in the Btg horizon and the Cg horizon, if it occurs.

The A horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2.

The Eg horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. It has common or many medium to coarse faint splotches that have chroma of 1 and 3 within a depth of 6 inches. Texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 3 to 6, and chroma of 1 or 2. Texture is fine sandy loam or sandy clay loam.

The Cg horizon, if it occurs, has hue of 10YR to 5GY, value of 4 to 7, and chroma of 1 or 2. Texture is fine sand or fine sandy loam. In some areas the horizon consists of sand mixed with shells or limestone gravel.

The limestone bedrock commonly starts at a depth of 40 to 70 inches in pedons that have a limestone substratum. Other pedons do not have limestone within a depth of 80 inches.

Satellite Series

The Satellite series consists of nearly level, somewhat poorly drained soils on low coastal ridges. These soils formed in sandy marine sediments. The slopes are less than 2 percent. These soils are hyperthermic, uncoated Aquic Quartzipsamments.

The Satellite soils are closely associated with Basinger, Canaveral, Immokalee, and Oldsmar soils. Basinger, Immokalee and Oldsmar soils are poorly drained and are in landscape positions lower than those of the Satellite soils. Basinger soils have a stained layer. Canaveral soils are on beach ridges and contain many shell fragments. Immokalee soils have a spodic horizon at a depth of 30 to 50 inches. Oldsmar soils have a spodic horizon at a depth of 30 to 50 inches and an argillic horizon at a depth of more than 50 inches.

Typical pedon of Satellite fine sand, about 2,600 feet east and 2,000 feet north of the southwest corner of sec. 23, T. 50 S., R. 26 E.

A—0 to 3 inches; gray (10YR 5/1) fine sand; weak fine granular structure; very friable; common fine and medium roots; moderately acid; clear wavy boundary.

C1—3 to 18 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and medium roots; moderately acid; clear wavy boundary.

C2—18 to 75 inches; white (10YR 8/1) fine sand; few fine prominent reddish yellow mottles; single grained; loose; few fine roots; moderately acid; clear wavy boundary.

C3—75 to 80 inches; light gray (10YR 7/2) fine sand; common fine prominent reddish yellow mottles; single grained; loose; moderately acid.

Reaction ranges from very strongly acid to slightly alkaline in all horizons. Texture is generally sand or fine sand; however, the surface layer is fine sand.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 or 2. It is 2 to 8 inches thick.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2. Sand grains are uncoated. The horizon has few to common mottles with value and chroma of 6 or higher at a depth of 18 to 36 inches.

Tuscawilla Series

The Tuscawilla series consists of nearly level, poorly drained soils on the flatwoods and hammocks. These soils formed in sandy over loamy marine sediments. The slopes are less than 2 percent. These soils are fine-loamy, siliceous, hyperthermic Typic Ochraqualfs.

The Tuscawilla soils are closely associated with Hilolo, Holopaw, Oldsmar, and Wabasso soils. Hilolo, Oldsmar, and Wabasso soils are in landscape positions similar to those of the Tuscawilla soils. Hilolo soils are calcareous throughout. Holopaw soils have a argillic horizon at a depth of 40 to 70 inches. Oldsmar soils have a spodic horizon at a depth of 30 to 50 inches and an argillic horizon at a depth of about 40 inches or more. Wabasso soils have a spodic horizon and an argillic horizon at a depth of 20 to 80 inches.

Typical pedon of Tuscawilla fine sand, about 400 feet north and 500 feet west of the southeast corner of sec. 36, T. 46 S., R. 29 E.

A—0 to 6 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; moderately acid; clear wavy boundary.

E—6 to 14 inches; light gray (10YR 7/1) fine sand; common medium faint splotches of white (10YR 8/2) and pale brown (10YR 6/3); single grained; loose; many fine and medium roots; moderately acid; clear wavy boundary.

Bt1—14 to 22 inches; dark grayish brown (10YR 4/2) sandy clay loam; few coarse faint dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; firm; sand grains coated and bridged with clay; few fine roots; slightly acid; clear wavy boundary.

Bt2—22 to 30 inches; grayish brown (10YR 5/2) sandy clay loam; few fine faint dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; firm; sand grains coated and bridged with clay; slightly acid; clear wavy boundary.

Btk—30 to 50 inches; gray (10YR 5/1) sandy clay loam; moderate medium subangular blocky structure; firm; slightly effervescent; moderately alkaline; abrupt wavy boundary.

C—50 to 80 inches; gray (10YR 5/1) loamy fine sand; massive; slightly effervescent; moderately alkaline.

The thickness of the solum is 30 to 50 inches.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. Reaction is moderately acid to moderately alkaline. The horizon is 3 to 6 inches thick.

The E horizon has hue of 10YR, value of 4 to 7, and chroma of 1. It has common or many medium to coarse faint splotches that have chroma of 1 and 3 at a depth of more than 6 inches. The texture of the E horizon is sand or fine sand. Reaction is moderately acid to moderately alkaline. The horizon is 3 to 10 inches thick.

The Bt and Bkt horizons have hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Texture is sandy clay loam, fine sandy loam, or sandy loam. Reaction is slightly alkaline acid to strongly alkaline.

The C horizon has hue of 10YR, 5GY, or 5Y; value of 5 to 8; and chroma of 1. Reaction is slightly alkaline to strongly alkaline. Texture is fine sand or loamy fine sand. Some pedons have a 2C horizon that consists of loose beds of sandy or loamy material, shells, and shell fragments that are stratified in varying proportions. Reaction is slightly alkaline or moderately alkaline.

Wabasso Series

The Wabasso series consists of nearly level, poorly drained soils on the flatwoods. These soils formed in sandy over loamy marine sediments. The slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

The Wabasso soils are closely associated with Hilolo, Holopaw, Oldsmar, and Tuscawilla soils. Hilolo, Oldsmar, and Tuscawilla soils are in landscape positions similar to those of the Wabasso soils. Hilolo soils have an argillic horizon at a depth of about 10 inches. They are calcareous throughout. Holopaw soils have an argillic horizon at a depth of 40 to 70 inches. Oldsmar soils have an argillic horizon at a depth of 40 to 70 inches. Tuscawilla soils do not have a spodic horizon, but they have an argillic horizon at a depth of less than 20 inches.

Typical pedon of Wabasso fine sand, about 2,300 feet north and 1,200 feet west of the southeast corner of sec. 36, T. 46 S., R. 29 E.

A—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; moderately acid; clear wavy boundary.

E—6 to 28 inches; gray (10YR 6/1) fine sand; common medium faint pale brown (10YR 6/3) and white (10YR 8/1) splotches at a depth of about 10 inches; single grained; loose; common fine and medium roots; moderately acid; clear wavy boundary.

Bh1—28 to 31 inches; black (10YR 2/1) fine sand; massive; strongly acid; clear wavy boundary.

Bh2—31 to 35 inches; very dark grayish brown (10YR 3/2) fine sand; massive; very strongly acid; clear wavy boundary.

Bt1—35 to 48 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak coarse subangular blocky structure; friable; slightly alkaline; sand grains coated and bridged with clay; clear wavy boundary.

Bt2—48 to 55 inches; gray (10YR 5/1) sandy clay loam; common coarse distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; slightly alkaline; sand grains coated and bridged with clay; clear wavy boundary.

Bt3—55 to 70 inches; yellowish brown (10YR 5/8) sandy clay loam; common coarse distinct gray (10YR 5/1) mottles; weak coarse subangular blocky structure; friable; slightly alkaline; sand grains coated and bridged with clay; gradual wavy boundary.

Cg—70 to 80 inches; light gray (10YR 6/1) loamy fine sand; common coarse distinct brownish yellow (10YR 6/6) mottles; massive; friable; slightly alkaline.

The thickness of the solum is 45 to 75 inches.

The A horizon has hue of 10YR, value of 2, and chroma of 1 or has value of 3 or 4 and chroma of 1 or 2. Reaction ranges from extremely acid to slightly acid. The horizon is 3 to 8 inches thick.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It has common to many distinct to prominent splotches that have value of 6 or more and chroma of 1 and 3 at a depth of 6 to 18 inches. Texture is sand or fine sand. Reaction ranges from extremely acid to slightly acid. The E horizon is 4 to 20 inches thick. The combined thickness of the A and E horizons is less than 30 inches.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. Texture is sand or fine sand. Reaction is very strongly acid to neutral. The Bh horizon is 3 to 10 inches thick.

The Bt horizon has hue of 10YR, value of 7, and chroma of 1 to 4 or has value of 5 or 6 and chroma of 1 to 8. The depth to the Bt horizon is less than 40 inches. Texture is fine sandy loam or sandy clay loam.

The C horizon is fine sand or loamy fine sand. Some pedons have fragments of sand-sized shell fragments in the C horizon.

Winder Series

The Winder series consists of level, very poorly drained soils in depressions and marshes. These soils formed in sandy and loamy marine sediments. The slopes are less than 1 percent. These soils are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs.

The Winder soils are closely associated with Chobee, Gator, Holopaw, and Riviera soils. Chobee, Gator, and Riviera soils are in landscape positions similar to those of the Winder soils. Chobee soils have a mollic epipedon. Gator soils are organic. Holopaw soils are in sloughs, and they have an argillic horizon at a depth of 40 to 70 inches. Riviera soils have an argillic horizon at a depth of 20 to 40 inches.

Typical pedon of Winder fine sand, in an area of Chobee, Winder, and Gator soils, depressional; about 1,000 feet north and 500 feet east of the southwest corner of sec. 19, T. 46 S., R. 30 E.

A—0 to 5 inches; dark gray (10YR 4/1) fine sand; more than 70 percent sand grains covered or coated with organic matter; weak fine granular structure; very friable; many fine roots; moderately acid; clear wavy boundary.

Eg—5 to 15 inches; light brownish gray (10YR 6/2) fine sand; few fine faint light gray mottles and common fine prominent black (10YR 2/1) areas of organic

accumulations; single grained; loose; many fine roots; moderately acid; clear irregular boundary.

Bt/E—15 to 18 inches; gray (10YR 5/1) fine sandy loam (B); common medium tongues of light brownish gray (10YR 6/2) fine sand; few medium distinct dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; friable; few fine roots; slightly acid; gradual irregular boundary.

Btg1—18 to 30 inches; gray (10YR 5/1) sandy clay loam; few medium prominent dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; clear wavy boundary.

Btg2—30 to 50 inches; dark gray (10YR 4/1) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; neutral; clear wavy boundary.

2Ck—50 to 80 inches; white (10YR 8/1) fine sandy loam; massive; about 10 percent calcium carbonate concretions; slightly effervescent; moderately alkaline.

The thickness of the solum ranges from 22 to 60 inches. Reaction is moderately acid to moderately alkaline.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1. Sand grains are dominantly coated or covered with organic matter. Texture is fine sand. The A horizon is 3 to 6 inches thick.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. It has common mottles with value of 6 or more and chroma of 2 or 3. Texture is sand or fine sand. The E horizon is 7 to 15 inches thick.

The B/A or B/E horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Texture ranges from fine sandy loam to sandy clay loam. The horizon has common or many tongues of sandy E material.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. Texture is sandy loam, fine sandy loam, or sandy clay loam. The horizon has common mottles with value of 4 or more and chroma of 6 or more.

The 2C horizon has hue of 10YR, 2.5Y, 5Y, or 5GY; value of 4 to 8; and chroma of 1 to 4. Texture is fine sandy loam or sandy clay loam. The content of calcium carbonate nodules is as much as 30 percent.

Wulfert Series

The Wulfert series consists of level, very poorly drained organic soils in tidal mangrove swamps. These soils formed in thick layers of organic material over sandy marine sediments. These soils are subject to daily tidal flooding. Slopes are less than 1 percent. These soils are sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Sulfihemists.

The Wulfert soils are closely associated with Canaveral, Durbin, Estero, and Peckish soils. Canaveral soils are somewhat poorly drained, sandy soils that are layered with shell fragments and are on the higher landforms. Durbin, Estero, and Peckish soils are in positions similar to those of the Wulfert soils. Durbin soils have muck to a depth of more than 51 inches. Estero soils have a spodic horizon. Peckish soils are sandy throughout.

Typical pedon of Wulfert muck, in an area of Durbin and Wulfert muck, frequently flooded; about 800 feet west and 500 feet south of the northeast corner of sec. 34, R. 26 E., T. 51 S.

Oa1—0 to 26 inches; dark reddish brown (5YR 2/2) muck; about 25 percent fiber, 3 percent rubbed; massive; friable; many fine and common medium roots; strongly acid; clear wavy boundary.

Oa2—26 to 40 inches; black (10YR 2/1) muck; about 90 percent fiber, 10 percent rubbed; massive; friable; common coarse roots; strongly acid; clear wavy boundary.

Cg—40 to 80 inches; dark gray (10YR 4/1) fine sand; single grained; loose; about 15 percent sand-sized shell fragments; extremely acid.

The organic material consists dominantly of sapric materials, but hemic materials may be found. Reaction in the Oa horizon ranges from extremely acid to neutral in the natural state and from extremely acid to slightly acid after drying. Reaction in the 2Cg horizon in the natural state ranges from extremely acid to slightly alkaline and from extremely acid to moderately acid after drying.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. The content of mineral material ranges from about 40 to 80 percent. The thickness of the Oa horizon ranges from about 16 to 48 inches.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. Texture is sand or fine sand with about 5 to 25 percent mostly sand-sized shell fragments.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). The volume of soft soil decreases excessively under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of the human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salt (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). An excessive amount of sulfur is in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Flatwoods. Broad, nearly level, low ridges of poorly drained, dominantly sandy soils that have a characteristic vegetation of an open forest of pine trees and a ground cover of sawpalmetto and pineland threeawn.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant that is not a grass or a sedge.

Fragile (in tables). The soil is easily damaged by use or disturbance.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the

surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the plants that are the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Drip (or trickle).—Water is applied slowly and under

low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Large stones (in tables). Rock fragments that are 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range condition. The present composition of the plant community on a range site in relation to the potential climax plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential climax vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables). Water is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the

swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slough. A broad, nearly level, poorly defined drainageway that is subject to sheet flow during the rainy season.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across

sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). An otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). An excessive amount of toxic substances in the soil, such as sodium or sulfur, severely hinders the establishment of vegetation or severely restricts plant growth.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). There is a risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors that are assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1944-83 at Fort Myers, Florida)

Month	Temperature					Precipitation	
	Average daily	Average daily maximum	Average daily minimum	Average number of days with temperatures of--		Average total	Average number of days with rainfall of 0.10 inch or more
				90 °F or higher	32 °F or lower		
	°F	°F	°F			In	
January	64.2	74.7	53.6	0	0	1.70	5
February	65.1	75.8	54.4	0	0	2.17	6
March	68.9	79.6	58.2	0	0	2.56	5
April	73.4	84.3	62.4	3	0	1.97	5
May	77.6	88.2	67.0	14	0	4.04	8
June	81.0	90.1	71.9	18	0	4.23	15
July	82.4	90.8	73.9	23	0	8.72	18
August	82.6	91.1	74.1	24	0	8.30	18
September	81.5	89.5	73.4	18	0	8.55	16
October	76.5	85.1	67.9	4	0	3.96	8
November	69.8	79.6	59.9	4	0	1.34	4
December	65.4	75.8	55.0	4	0	1.43	5
Total	74.0	83.7	64.3	112	0	53.97	113

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
2	Holopaw fine sand, limestone substratum	18,884	2.8
3	Malabar fine sand	18,321	2.7
4	Chobee limestone substratum and Dania mucks, depressional	1,123	0.2
6	Riviera, limestone substratum-Copeland fine sands	13,035	1.9
7	Immokalee fine sand	50,412	7.3
8	Myakka fine sand	3,480	0.5
10	Oldsmar fine sand, limestone substratum	10,092	1.5
11	Hallandale fine sand	26,277	3.8
14	Pineda fine sand, limestone substratum	36,699	5.3
15	Pomello fine sand	2,016	0.3
16	Oldsmar fine sand	30,787	4.5
17	Basinger fine sand	20,894	3.0
18	Riviera fine sand, limestone substratum	17,070	2.5
20	Ft. Drum and Malabar, high, fine sands	8,048	1.2
21	Boca fine sand	27,840	4.1
22	Chobee, Winder and Gator soils, depressional	13,526	2.0
23	Holopaw and Okeelanta soils, depressional	6,059	0.9
25	Boca, Riviera, limestone substratum, and Copeland fine sands, depressional	108,070	15.7
27	Holopaw fine sand	18,405	2.7
28	Pineda and Riviera fine sands	6,629	1.0
29	Wabasso fine sand	9,374	1.4
31	Hilolo, Jupiter, and Margate fine sands	8,475	1.2
32	Urban land	9,300	1.4
33	Urban land-Holopaw-Basinger complex	5,724	0.8
34	Urban land-Immokalee-Oldsmar, limestone substratum, complex	5,369	0.8
35	Urban land-Aquents complex, organic substratum	6,845	1.0
36	Udorthents, shaped	5,151	0.8
37	Tuscawilla fine sand	7,050	1.0
38	Urban land-Matlacha-Boca complex	2,955	0.4
39	Satellite fine sand	1,681	0.2
40	Durbin and Wulfert mucks, frequently flooded	68,717	10.0
41	Urban land-Satellite complex	703	0.1
42	Canaveral-Beaches complex	2,307	0.3
43	Winder, Riviera, limestone substratum, and Chobee soils, depressional	30,167	4.4
45	Paola fine sand, gently rolling	489	0.1
48	Pennsuco silt loam	7,697	1.1
49	Hallandale and Boca fine sands	20,262	3.0
50	Ochopee fine sandy loam, low	19,049	2.8
51	Ochopee fine sandy loam	13,766	2.0
52	Kesson muck, frequently flooded	6,033	0.9
53	Estero and Peckish soils, frequently flooded	4,746	0.7
54	Jupiter-Boca complex	10,001	1.5
56	Basinger fine sand, occasionally flooded	938	0.1
	Water bodies less than 40 acres in size	2,115	0.3
	Total	686,581	100.0

TABLE 3.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Oranges	Tomatoes	Cabbage	Peppers	Cucumbers	Watermelons	Bahiagrass
		Boxes	Tons	Crates	Bu	Tons	Tons	AUM*
2--------------- Holopaw	IVw	375	7.0	240	---	---	---	8
3--------------- Malabar	IVw	325	13	200	---	6	---	---
4--------------- Chobee and Dania	VIIw	---	---	---	---	---	---	---
6--------------- Riviera-Copeland	IIIw	---	---	---	---	---	---	8
7--------------- Immokalee	IVw	350	15	200	---	---	---	---
8--------------- Myakka	IVw	350	15	320	---	---	---	9.0
10-------------- Oldsmar	IVw	325	8	---	750	---	---	---
11-------------- Hallandale	IVw	375	16	300	---	---	--	---
14-------------- Pineda	IIIw	425	13	250	-	---	---	8
15-------------- Pomello	VIs	250	---	--	---	---	---	---
16-------------- Oldsmar	IVw	325	8	---	750	---	---	--
17-------------- Basinger	IVw	350	13	400	---	---	---	---
18-------------- Riviera	IIIw	425	8	250	---	---	---	7.5
20-------------- Ft. Drum and Malabar	IVw	375	9	---	---	---	---	8
21-------------- Boca	IIIw	375	16	---	800	---	---	---
22-------------- Chobee, Winder and Gator	VIIw	---	---	---	---	---	---	---
23-------------- Holopaw and Okeelanta	VIIw	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 3.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Oranges	Tomatoes	Cabbage	Peppers	Cucumbers	Watermelons	Bahiagrass
		Boxes	Tons	Crates	Bu	Tons	Tons	AUM*
25-------------- Boca, Riviera and Copeland	VIIw	---	---	---	---	---	---	---
27-------------- Holopaw	IVw	375	7.0	240	---	---	---	8.0
28-------------- Pineda and Riviera	IIIw	425	---	318	---	---	---	---
29-------------- Wabasso	IIIw	400	13	250	---	---	---	---
31**------------		386	12	310	---	---	---	---
Hilolo---------	IIIw							
Jupiter ------	IVw							
Margate-------	IVw							
32**------------ Urban land	---	---	---	---	---	---	---	---
33**------------ Urban land-Holopaw-Basinger	---	---	---	---	---	---	---	---
34**------------ Urban land-Immokalee-Oldsmar	---	---	---	---	---	---	---	---
35**------------ Urban land-Aquents	---	---	---	---	---	---	---	---
36**------------ Udorthents	---	---	---	---	---	---	---	---
37-------------- Tuscawilla	IIIw	425	---	---	---	---	---	9
38**------------ Urban land-Matlacha-Boca	---	---	---	---	---	---	---	---
39-------------- Satellite	VIs	---	---	---	---	---	5.0	5.0
40-------------- Durbin and Wulfert	VIIIw	---	---	---	---	---	---	---
41**------------ Urban land-Satellite	---	---	---	---	---	---	---	---
42**------------ Canaveral	VIs	400	---	---	---	---	---	---

See footnote at end of table.

TABLE 3.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Oranges	Tomatoes	Cabbage	Peppers	Cucumbers	Watermelons	Bahiagrass
		Boxes	Tons	Crates	Bu	Tons	Tons	AUM*
43: Winder, Riviera and Chobee	VIIw	---	---	---	--	---	---	---
45: Paola	VIs	250	---	---	---	---	---	-
48: Pennsuco	IVw	---	8	---	---	---	---	6
49: Hallandale and Boca	Vw	---	---	---	---	---	---	---
50, 51: Ochopee	IVw	---	8	---	---	---	---	6
52: Kesson	VIIIw	---	---	---	---	---	---	--
53: Estero and Peckish	VIIIw	---	---	---	---	---	---	---
54**:		---	---		---	---	---	---
Jupiter	VIw							
Boca	Vw							
56: Basinger	VIw	---	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 4. RANGE PRODUCTIVITY

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Map symbol and soil name	Range site	Potential annual production for kind of growing season: Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
2: Holopaw	Slough	8,000	5,500	4,000
3: Malabar	Slough	8,000	5,500	4,000
4: Chobee-Dania	Freshwater Marshes and Ponds	10,000	8,000	5,000
7: Immokalee	South Florida Flatwoods	6,000	5,000	3,000
8: Myakka	South Florida Flatwoods	6,000	5,000	3,000
10: Oldsmar	South Florida Flatwoods	6,000	5,000	3,000
11: Hallandale	South Florida Flatwoods	6,000	5,000	3,000
14: Pineda	Slough	8,000	5,500	4,000
15: Pomello	Sand Pine Scrub	3,500	2,000	1,500
16: Oldsmar	South Florida Flatwoods	6,000	5,000	3,000
17: Basinger	Slough	8,000	5,500	4,000
18: Riviera	Slough	8,000	5,500	4,000
20: Ft. Drum-Malabar	Cabbage Palm Flatwoods	9,000	7,500	4,500
21: Boca	South Florida Flatwoods	6,000	5,000	3,000
22: Chobee-Winder-Gator	Freshwater Marshes and Ponds	10,000	8,000	5,000
23: Holopaw-Okeelanta	Freshwater Marshes and Ponds	10,000	8,000	5,000
27: Holopaw	Slough	8,000	5,500	4,000
28: Pineda-Riviera	Slough	8,000	5,500	4,000
29: Holopaw	South Florida Flatwoods	6,000	5,000	3,000
31: Hilolo-Jupiter-Margate	Upland Hardwood Hammock	4,500	3,500	2,500

TABLE 4.--RANGE PRODUCTIVITY--Continued

Map symbol and soil name	Range site	Potential annual production for kind of growing season		
		Favorable	Average	Unfavorable
		Lb/acre	Lb/acre	Lb/acre
37: Tuscawilla	Wetland Hardwood Hammock	3,500	2,500	2,000
39: Satellite	Sand Pine Scrub	3,500	2,000	1,500
43: Winder-Riviera-Chobee	Freshwater Marshes and Ponds	10,000	8,000	5,000
48: Pennusco	Slough	8,000	5,500	4,000
49: Hallandale-Boca	Slough	8,000	5,500	4,000
50: Ochopee	Slough	8,000	5,500	4,000
51: Ochopee	Scrub Cypress	4,000	3,000	2,000
54: Jupiter-Boca	Scrub Cypress	4,000	3,000	2,000

TABLE 5.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2-------------------- Holopaw	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness.
3-------------------- Malabar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
4*:					
Chobee--------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Dania---------------	Severe: ponding, excess humus, depth to rock.	Severe: ponding, excess humus, depth to rock.	Severe: excess humus, ponding, depth to rock.	Severe: ponding, excess humus.	Severe: ponding, depth to rock, excess humus.
6*:					
Riviera ----	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
Copeland------------	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
7-------------------- Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
8---- Myakka	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
10------------------- Oldsmar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness.
11------------------- Hallandale	Severe: wetness, too sandy.	Severe: wetness, too sandy, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: wetness, too sandy.	Severe: wetness, droughty, depth to rock.
14------------------- Pineda	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
15------------------- Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
16------------------- Oldsmar	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
17 Basinger	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
18 Riviera	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
20*:					
Ft. Drum	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
Malabar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
21 Boca	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
22*:					
Chobee	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
Winder	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
Gator	Severe: ponding, percs slowly, excess humus.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, percs slowly.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
23*:					
Holopaw	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
Okeelanta	Severe: ponding, excess humus, percs slowly.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, percs slowly.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
25*:					
Boca	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
Riviera	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
Copeland	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
27 Holopaw	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
28*:					
Pineda	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Riviera	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
29 Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
31*:					
Hilolo	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
Jupiter	Severe: wetness, too sandy, depth to rock.	Severe: wetness, too sandy, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: wetness, too sandy.	Severe: wetness, depth to rock.
Margate	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
32*. Urban land					
33*:					
Urban land.					
Holopaw	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Basinger	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
34*:					
Urban land.					
Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Oldsmar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness.
35*:					
Urban land.					

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
35*: Aquents.					
36*. Udorthents					
37 Tuscawilla	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
38*: Urban land.					
Matlacha	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, small stones.	Severe: too sandy.	Moderate: too sandy, large stones, small stones.
Boca	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
39 Satellite'	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
40*: Durbin	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: excess salt, wetness, flooding.
Wulfert	Severe: wetness, excess humus, excess salt.	Severe: flooding, wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: excess salt, excess sulfur, wetness.
41*: Urban land.					
Satellite	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
42* Canaveral	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
43*: Winder	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
Riviera	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.

See footnote at end of table.

TABLE 5. RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
43*:					
Chobee	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
45 Paola	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
48 Pennsuco	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
49*:					
Hallandale	Severe: wetness, too sandy, depth to rock.	Severe: wetness, too sandy, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: wetness, too sandy.	Severe: wetness, droughty, depth to rock.
Boca	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
50, 51 Ochopee	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: depth to rock, wetness.
52 Kesson	Severe: flooding, wetness.	Severe: wetness, excess salt.	Severe: wetness, flooding.	Severe: wetness.	Severe: excess salt, flooding, wetness.
53*:					
Estero	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: excess salt, wetness, flooding.
Peckish	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy, excess salt.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: excess salt, excess sulfur, wetness.
54*:					
Jupiter	Severe: wetness, too sandy, depth to rock.	Severe: wetness, too sandy, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: wetness, too sandy.	Severe: wetness, depth to rock.
Boca	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
56 Basinger	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
2 Holopaw	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
3 Malabar	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
4*:										
Chobee	Poor	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good.
Dania	Very poor.	Poor	Poor	Very poor.	Very poor.	Good	Good	Poor	Very poor.	Good.
6*:										
Riviera	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Copeland	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
7 Immokalee	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
8 Myakka	Poor	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor.
10 Oldsmar	Poor	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Poor.
11 Hallandale	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
14 Pineda	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
15 Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
16 Oldsmar	Poor	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Poor.
17 Basinger	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
18 Riviera	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Poor	Very poor.	Fair.
20*:										
Ft. Drum	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Malabar	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Poor	Fair.
21 Boca	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
22*:										
Chobee	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
22*:										
Winder	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Gator	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good	Good	Very poor.	Very poor.	Good.
23*:										
Holopaw	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Okeelanta	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good	Good	Very poor.	Very poor.	Good.
25*:										
Boca	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Riviera	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Copeland	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
27 Holopaw	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
28*:										
Pineda	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
Riviera	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair.
29 Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.
31*:										
Hilolo	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Jupiter	Poor	Poor	Fair	Poor	Poor	Good	Poor	Poor	Poor	Fair.
Margate	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
32*. Urban land										
33*:										
Urban land.										
Holopaw	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
Basinger	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
34*:										
Urban land.										
Immokalee	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
Oldsmar	Poor	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Fair	Poor.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
35*:										
Urban land.										
Aquents.										
36*. Udorthents										
37 Tuscawilla	Poor	Fair	Fair	Good	Fair	Fair	Fair	Fair	Good	Fair.
38*:										
Urban land.										
Matlacha.										
Boca	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
39 Satellite	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
40*:										
Durbin	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor.
Wulfert	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.
41*:										
Urban land.										
Satellite	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
42* Canaveral	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
43*:										
Winder	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Riviera	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Chobee	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.
45 Paola	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
48 Pennsuco	Poor	Fair	Fair	Very poor.	Very poor.	Fair	Good	Poor	Very poor.	Fair.
49*:										
Hallandale	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
Boca	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
50, 51 Ochopee	Poor	Fair	Fair	Poor	Poor	Fair	Good	Poor	Poor	Fair.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
52--------------Kesson	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.
53*:										
Estero------------	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
Peckish-----------	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.
54*:										
Jupiter-----------	Poor	Poor	Fair	Poor	Poor	Good	Poor	Poor	Poor	Fair.
Boca--------------	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
56--------------Basinger	Very poor.	Very poor.	Poor	Fair	Poor	Fair	Fair	Very poor.	Poor	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2------- Holopaw	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3------- Malabar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
4*:					
Chobee------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
Dania------------	Severe: depth to rock, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, depth to rock, excess humus.
6*:					
Riviera--------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Copeland-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
7------- Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
8----------------- Myakka	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
10------- Oldsmar	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
11------------ Hallandale	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty, depth to rock.
14---------------- Pineda	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
15---------------- Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
16---------------- Oldsmar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
17---------------- Basinger	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
18---------------- Riviera	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
20*:					
Ft. Drum	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Malabar----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
21---------------- Boca	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
22*:					
Chobee-----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Winder-----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Gator-	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
23*:					
Holopaw----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
Okeelanta--------	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
25*:					
Boca-------------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
Riviera----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
Copeland---------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
27---------------- Holopaw	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
28*:					
Pineda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Riviera	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
29 Wabasso	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
31*:					
Hilolo	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Jupiter	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, depth to rock.
Margate	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
32* Urban land	Variable	Variable	Variable	Variable	Variable.
33*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Holopaw	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Basinger	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
34*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Oldsmar	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
35*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Aquents	Severe: cutbanks cave, excess humus, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.

See footnote at end of table.

TABLE 7.- BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
36 Udorthents	Severe: cutbanks cave, wetness.	Moderate: wetness, large stones.	Moderate: wetness, large stones.	Moderate: wetness, large stones.	Severe: small stones, large stones, droughty.
37 Tuscawilla	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
38*: Urban land	Variable	Variable	Variable	Variable	Variable.
Matlacha	Severe: cutbanks cave, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
Boca	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
39 Satellite	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
40*: Durbin	Severe: cutbanks cave, excess humus, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, wetness, flooding.	Severe: excess salt, excess sulfur, wetness.
Wulfert	Severe: cutbanks cave, excess humus, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, wetness, flooding.	Severe: excess salt, excess sulfur, wetness.
41*: Urban land	Variable	Variable	Variable	Variable	Variable.
Satellite	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
42*: Canaveral	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
Beaches	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, droughty.
43*: Winder	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Riviera	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
43*:					
Chobee	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
45 Paola	Severe: cutbanks cave.	Slight	Moderate: slope.	Slight	Severe: droughty.
48 Pennsuco	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
49*:					
Hallandale	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty, depth to rock.
Boca	Severe: depth to rock, cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
50, 51 Ochopee	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.
52 Kesson	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
53*:					
Estero	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
Peckish	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, excess sulfur, wetness.
54*:					
Jupiter	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, depth to rock.
Boca	Severe: depth to rock, cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
56 Basinger	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2: Holopaw	Severe: wetness, percs slowly, poor filter.	Severe: wetness, seepage.	Severe: depth to rock, too sandy, wetness.	Severe: wetness, seepage.	Poor: wetness, seepage, too sandy.
3: Malabar	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
4*:					
Chobee	Severe: ponding, percs slowly.	Severe: ponding.	Severe: depth to rock, ponding.	Severe: ponding.	Poor: ponding.
Dania	Severe: depth to rock, ponding, poor filter.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding, excess humus.
6*:					
Riviera	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: depth to rock, seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Copeland	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: area reclaim, wetness.
7: Immokalee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
8: Myakka	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
10: Oldsmar	Severe: wetness, percs slowly, poor filter.	Severe: wetness, seepage.	Severe: depth to rock, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, seepage, wetness.
11: Hallandale	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
14: Pineda	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: depth to rock, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.

See footnote at end of table.

TABLE 8.--SANITARY FACTLITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15 Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
16 Oldsmar	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
17 Basinger	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
18 Riviera	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
20*:					
Ft. Drum	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Malabar	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
21 Boca	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
22*:					
Chobee	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, ponding.
Winder	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding, thin layer.
Gator	Severe: ponding, percs slowly, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
23*:					
Holopaw	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Okeelanta	Severe: ponding, percs slowly, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage.	Severe: seepage, ponding.	Poor: ponding, thin layer.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
25*:					
Boca	Severe: depth to rock, ponding, poor filter.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, ponding, too sandy.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, seepage, too sandy.
Riviera	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: depth to rock, seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Copeland	Severe: depth to rock, ponding.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding.
27 Holopaw	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
28*:					
Pineda	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Riviera	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
29 Wabasso	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
31*:					
Hilolo	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: wetness.
Jupiter	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, seepage, too sandy.
Margate	Severe: depth to rock, ponding, poor filter.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, seepage, too sandy.
32*. Urban land					
33*: Urban land.					

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
33*:					
Holopaw	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Basinger	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
34*:					
Urban land.					
Immokalee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Oldsmar	Severe: wetness, percs slowly, poor filter.	Severe: wetness, seepage.	Severe: depth to rock, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, seepage, wetness.
35*:					
Urban land.					
Aquents.					
36*.					
Udorthents					
37 Tuscawilla	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness, thin layer.
38*:					
Urban land.					
Matlacha	Severe: percs slowly, wetness, poor filter.	Severe: wetness, seepage.	Severe: depth to rock, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, seepage.
Boca	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
39 Satellite	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
40*:					
Durbin	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus, excess salt.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
40*:					
Wulfert	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, wetness, excess humus.
41*:					
Urban land.					
Satellite	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
42* Canaveral	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
43*:					
Winder	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding, thin layer.
Riviera	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: depth to rock, seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Chobee	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, ponding.
45 Paola	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
48 Pennsuco	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.
49*:					
Hallandale	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
Boca	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
50, 51 Ochopee	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
52 Kesson	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
53*:					
Estero----------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Peckish-----------	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
54*:					
Jupiter----------	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, seepage, too sandy.
Boca----- ---------	Severe: depth to rock, wetness, poor filter.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, wetness, too sandy.	Severe: depth to rock, seepage, wetness.	Poor: depth to rock, seepage, too sandy.
56 --------------- Basinger	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
2 Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
3 Malabar	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
4*:				
Chobee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Dania	Poor: depth to rock, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: depth to rock, excess humus, wetness.
6*:				
Riviera	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
Copeland	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
7 Immokalee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
8 Myakka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
10 Oldsmar	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
11 Hallandale	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: depth to rock, too sandy, wetness.
14 Pineda	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
15 Pomello	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
16 Oldsmar	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
17 Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
18 Riviera	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
20*:				
Ft. Drum	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Malabar	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
21 Boca	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
22*:				
Chobee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
Winder	Poor: wetness.	Probable	Probable	Poor: wetness.
Gator	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
23*:				
Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Okeelanta	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
25*:				
Boca	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
Riviera	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
Copeland	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
27 Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
28*:				
Pineda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Riviera	Poor: wetness.	Probable	Probable	Poor: too sandy, wetness.
29 Wabasso	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
31*:				
Hilolo	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Jupiter	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: depth to rock, too sandy, wetness.
Margate	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
32* Urban land	Variable	Variable	Variable	Variable.
33*:				
Urban land	Variable	Variable	Variable	Variable.
Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
34*:				
Urban land	Variable	Variable	Variable	Variable.
Immokalee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Oldsmar	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
35*:				
Urban land	Variable	Variable	Variable	Variable.
Aquents	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
36 Udorthents	Fair: depth to rock, thin layer, large stones.	Improbable: thin layer.	Improbable: thin layer.	Poor: too sandy, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
37 Tuscawilla	Poor: wetness.	Probable	Improbable: too sandy.	Poor: small stones, wetness.
38*:				
Urban land	Variable	Variable	Variable	Variable.
Matlacha	Fair: depth to rock, thin layer, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones.
Boca	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
39 Satellite	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
40*:				
Durbin	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, excess salt, wetness.
Wulfert	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, excess salt, wetness.
41*:				
Urban land	Variable	Variable	Variable	Variable.
Satellite	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
42*:				
Canaveral	Fair: wetness.	Probable	Probable	Poor: too sandy.
Beaches	Poor: wetness.	Probable	Improbable: too sandy.	Poor: area reclaim, too sandy, excess salt.
43*:				
Winder	Poor: wetness.	Probable	Probable	Poor: wetness.
Riviera	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
Chobee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
45 Paola	Good	Probable	Improbable: too sandy.	Poor: too sandy.
48 Pennsuco	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
49*:				
Hallandale	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: depth to rock, too sandy, wetness.
Boca	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
50, 51 Ochopee	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, wetness.
52 Kesson	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, excess salt, wetness.
53*:				
Estero	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, excess salt, wetness.
Peckish	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, excess salt, wetness.
54*:				
Jupiter	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: depth to rock, too sandy, wetness.
Boca	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
56 Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
2 Holopaw	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
3 Malabar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
4*:						
Chobee	Moderate: seepage, depth to rock.	Severe: thin layer, ponding.	Severe: slow refill.	Ponding, percs slowly.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
Dania	Severe: depth to rock.	Severe: excess humus, ponding.	Severe: depth to rock, cutbanks cave.	Ponding, depth to rock, subsides.	Ponding, soil blowing, depth to rock.	Wetness, depth to rock.
6*:						
Riviera	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
Copeland	Severe: seepage.	Severe: thin layer, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
7 Immokalee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, droughty.
8 Myakka	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, droughty.
10 Oldsmar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave, slow refill.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
11 Hallandale	Severe: depth to rock.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
14 Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave, slow refill.	Percs slowly	Wetness, fast intake, droughty.	Wetness, droughty, rooting depth.

See footnote at end of table.

TABLE 10. WATER MANAGEMENT Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
15 Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Droughty.
16 Oldsmar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
17 Basinger	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
18 Riviera	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
20*: Ft. Drum	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
Malabar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
21 Boca	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
22*: Chobee	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, soil blowing.	Wetness, percs slowly.
Winder	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, droughty, fast intake.	Wetness, droughty, percs slowly.
Gator	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
23*: Holopaw	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
Okeelanta	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
25*:						
Boca	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: depth to rock, cutbanks cave.	Ponding, depth to rock, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty, depth to rock.
Riviera	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, cutbanks cave.	Droughty, ponding, fast intake.	Wetness, droughty.
Copeland	Severe: seepage.	Severe: thin layer, ponding.	Severe: depth to rock, cutbanks cave.	Ponding, depth to rock.	Ponding, droughty, fast intake.	Wetness, droughty, depth to rock.
27 Holopaw	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
28*:						
Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
Riviera	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
29 Wabasso	Severe: seepage.	Severe: thin layer, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, droughty, fast intake.	Wetness, droughty, rooting depth.
31*:						
Hilolo	Moderate: seepage, depth to rock.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Favorable	Wetness, droughty, fast intake.	Wetness, droughty, rooting depth.
Jupiter	Severe: depth to rock.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
Margate	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
32* Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
33*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Holopaw	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
33*:						
Basinger	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
34*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Immokalee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, droughty.
Oldsmar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave, slow refill.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
35*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Aquents	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
36 Udorthents	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Large stones, slope, cutbanks cave.	Slope, large stones, wetness.	Large stones, droughty.
37 Tuscawilla	Severe: seepage.	Severe: wetness.	Severe: cutbanks cave.	Favorable	Wetness, droughty, fast intake.	Wetness, droughty.
38*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Matlacha	Severe: seepage.	Severe: seepage, piping.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty, rooting depth.
Boca	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
39 Satellite	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
40*:						
Durbin	Severe: seepage.	Severe: excess humus, wetness, excess salt.	Severe: salty water, cutbanks cave.	Flooding, subsides, excess salt.	Wetness, soil blowing, flooding.	Wetness, excess salt.
Wulfert	Severe: seepage.	Severe: excess humus, wetness, excess salt.	Severe: salty water, cutbanks cave.	Flooding, subsides, excess salt.	Wetness, soil blowing, flooding.	Wetness, excess salt.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
41*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Satellite	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
42*:						
Canaveral	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, droughty.
Beaches	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: salty water, cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty.	Wetness, excess salt, droughty.
43*:						
Winder	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, droughty, fast intake.	Wetness, droughty, percs slowly.
Riviera	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, cutbanks cave.	Droughty, ponding, fast intake.	Wetness, droughty.
Chobee	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, fast intake, soil blowing.	Wetness, percs slowly.
45 Paola	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Droughty.
48 Pennsuco	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Favorable	Wetness	Wetness.
49*:						
Hallandale	Severe: depth to rock.	Severe: seepage, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
Boca	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
50, 51 Ochopee	Severe: depth to rock.	Severe: thin layer, wetness.	Severe: depth to rock.	Depth to rock	Wetness, soil blowing, depth to rock.	Wetness, depth to rock.
52 Kesson	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: salty water, cutbanks cave.	Flooding, cutbanks cave, excess salt.	Wetness, droughty.	Wetness, excess salt, droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
53*:						
Estero	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: salty water, cutbanks cave.	Flooding, cutbanks cave, excess salt.	Wetness, droughty, soil blowing.	Wetness, excess salt, droughty.
Peckish	Severe: seepage.	Severe: seepage, wetness, excess salt.	Severe: salty water, cutbanks cave.	Flooding, cutbanks cave, excess salt.	Wetness, droughty, fast intake.	Wetness, excess salt, droughty.
54*:						
Jupiter	Severe: depth to rock.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, fast intake.	Wetness, depth to rock.
Boca	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, depth to rock.
56 Basinger	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
2---------------- Holopaw	0-57	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	70-95	2-10	---	NP
	57-62	Sandy loam, sandy clay loam, fine sandy loam.	SM, SM-SC	A-2-4	0	99-100	95-100	70-99	15-30	<25	NP-7
	62	Weathered bedrock	---		---	---	---	---	---	---	---
3---------------- Malabar	0-15	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	15-29	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	3-12	---	NP
	29-55	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	55-72	Sandy clay loam, fine sandy loam, sandy loam.	SC, SM-SC, SM	A-2, A-4, A-6	0	100	100	80-100	20-40	<35	NP-20
	72-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
4*:											
Chobee----------	0-6	Muck------------	PT	---	---	---	---	---	---	---	---
	6-13	Sandy loam, fine sandy loam.	SP-SM, SM	A-2-4	0	100	95-100	85-99	12-25	<40	NP-10
	13-45	Sandy clay loam, sandy loam, fine sandy loam.	SC, SP-SM, SM, SM-SC	A-2, A-6, A-4	---	---	---	80-99	---	---	
	45	Weathered bedrock	---	---	--		---	---	---	---	---
Dania-----------	0-10	Muck-------------	PT	-	0	---	---	---	---	---	---
	10-12	Sand, fine sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0-3	95-100	90-100	80-95	2-15	<25	NP-3
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
6*:											
Riviera---------	0-32	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	32-54	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	15-35	<35	NP-15
	54	Weathered bedrock	---	---		--	---	---	---	---	---
Copeland--------	0-14	Fine sand--	SP SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
	14-18	Fine sand, loamy sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
	18-24	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	20-35	17-37	5-20
	24-30	Marl-------------	SM, SM-SC	A-2-4	0	75-95	70-85	65-80	20-35	<20	NP-7
	30	Weathered bedrock	---		---	---	---	---	---	---	---
7---------------- Immokalee	0-6	Fine sand-------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	6-35	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	35-49	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	70-100	5-21		NP
	49-80	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10		NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
8 --------------- Myakka	0-7	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	7-27	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	27-35	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	35-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
10--------------- Oldsmar	0-35	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	35-50	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	50-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2, A-4, A-6	0	100	100	80-99	25-40	25-40	5-15
	60	Unweathered bedrock.									
11--------------- Hallandale	0-3	Fine sand--------	SP, SP-SM	A-3	0	100	100	90-100	2-6	---	NP
	3-12	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	90-100	2-12	---	NP
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
14--------------- Pineda	0-30	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	30-55	Fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	65-85	13-35	<30	NP-15
	55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15--------------- Pomello	0-35	Fine sand--------	SP, SP-SM	A-3	0	100	100	60-100	1-8	---	NP
	35-60	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	60-100	6-15	---	NP
	60-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	0	100	100	60-100	4-10	---	NP
16 -------- Oldsmar	0-35	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	35-50	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A 3	0	100	100	80 100	5 20		NP
	50-80	Fine sandy loam, sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-100	20-35	20-35	5-15
17--------------- Basinger	0-3	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	3-25	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	25-44	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	44-80	Sand, fine sand	SP, SP SM	A 3, A-2-4	0	100	100	85-100	2-12	---	NP
18--------------- Riviera	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	90-99	2-5	---	NP
	6-32	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-99	2-5	---	NP
	32-54	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	90-99	15-35	<40	NP-15
	54	Weathered bedrock	---	---	---	---	---	---	---	---	---
20*: Ft. Drum--------	0-5	Fine sand--------	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
	5-20	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
	20-80	Sand, fine sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	95-100	95-100	90-100	2-15	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
20*:											
Malabar	0-15	Fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	15-29	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	3-12	---	NP
	29-55	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	55-72	Fine sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2, A-4, A-6	0	100	100	80-100	20-40	<35	NP-20
	72-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
21 Boca	0-4	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	4-26	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	26-30	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC	A-2, A-6, A-4	0	100	100	80-100	17-40	16-37	5-20
	30	Unweathered bedrock.	---	---	---		---	---	---	---	---
22*:											
Chobee	0-13	Fine sandy loam	SP-SM, SM	A-2-4	0	100	100	85-100	12-25	<40	NP-10
	13-47	Sandy loam, fine sandy loam, sandy clay loam.	SP-SM, SM, SC, SM-SC	A-2-4, A-2-6, A-6, A-7	0	100	100	85-100	12-45	<45	NP-25
	47-80	Fine sand, loamy sand, fine sandy loam.	SP-SM, SM	A-2-4	0	100	100	80-100	12-25	<40	NP-10
Winder	0-15	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	15-18	Loamy sand, sandy loam, fine sandy loam.	SM	A-2-4	0	100	100	80-100	15-25	<35	NP-10
	18-50	Sandy clay loam	SC	A-2-4, A-2-6	0	100	100	80-100	18-35	20-40	9-26
	50-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC, GM-GC	A-2-4, A-2-6, A-1-B	0	60-100	50-95	40-90	15-35	<35	NP-20
Gator	0-25	Muck	PT	A-8	0	---		---	---	---	---
	25-80	Loam, fine sandy loam, sandy clay loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	80-99	25-35	<40	NP-15
23*:											
Holopaw	0-57	Fine sand	SP, SP-SM	A-3	0	100	95-100	70-95	2-10	---	NP
	57-62	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	95-100	70-95	15-30	<25	NP-7
	62-80	Loamy sand, loamy fine sand, fine sand.	SM, SP-SM	A-2-4	0	100	95-100	70-95	11-20	---	NP
Okeelanta	0-20	Muck	PT	A-8	0	---	---	---	---	---	---
	20-52	Fine sand	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	52-80	Loam, fine sandy loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	80-99	25-35	<40	NP-15

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
25*:											
Boca	0-4	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-99	2-12	---	NP
	4-26	Sand, fine sand	SP, SP SM	A-3, A-2-4	0	100	100	80-99	2-12	---	NP
	26-30	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-6, A-2-6, A-4	0	100	100	80 99	25-40	16 37	6-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Riviera	0-32	Fine sand	SP, SP-SM	A 3, A 2 4	0	100	100	80-100	4-12	---	NP
	32-54	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2 4, A-2-6	0	100	100	80-100	15-35	<35	NP-15
	54	Weathered bedrock	---	---	---	---	---	---	---	--	
Copeland	0-14	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
	14-18	Fine sand, loamy sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
	18-24	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A 2 4, A-2-6	0	100	100	80-100	20 35	17-37	5-20
	24-30	Marl	SM, SM-SC	A-2-4	0	75-95	70-85	65-80	20 35	<20	NP-7
	30	Weathered bedrock	---	---	---	---	---	--	---	---	.
27 Holopaw	0-57	Fine sand	SP, SP-SM	A-3	0	100	95-100	70-95	2-10	---	NP
	57-62	Sandy loam, sandy clay loam, fine sandy loam.	SM, SM-SC	A-2-4	0	100	95-100	70-99	15-30	<25	NP-7
	62-80	Loamy sand, loamy fine sand, fine sand.	SM	A-2-4	0	100	95-100	70-99	11 20	---	NP
28*:											
Pineda	0-4	Fine sand	SP, SP-SM	A-3	0	100	100	80 95	2 8	---	NP
	4-30	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-95	2 10	---	NP
	30-55	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2-4, A-2-6	0	100	100	65-95	15-35	<35	NP-20
	55-80	Sand, loamy sand, fine sand.	SP-SM, SM, SP	A-3, A 2 4	0	95-100	90-100	80-95	4-15	---	NP
Riviera	0-32	Fine sand	SP, SP-SM	A 3, A-2-4	0	100	100	80-100	4-12	---	NP
	32-54	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15 35	<35	NP-15
	54-80	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	20-35	20-40	4-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
29-------------- Wabasso	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	6-28	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	28-35	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
	35-70	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	95-100	20-35	20-30	5-13
	70-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
31*: Hilolo----------	0-12	Fine sand--------	SP-SM	A-2-4, A-3	0	100	100	80-95	5-12	---	NP
	12-20	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6, A-6, A-4	0	100	100	85-99	25-50	<30	NP-15
	20-35	Sandy clay loam	SC	A-6, A-7-6	0	100	100	85-99	36-50	23-44	10-24
	35-50	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	85-99	13-35	<30	NP-15
	50-61	Loamy sand, loamy fine sand, fine sandy loam.	SM	A-2-4	0	100	100	85-99	13-25	---	NP
	61	Weathered bedrock	---	---	---	---	---	---	---	---	---
Jupiter---------	0-4	Fine sand--------	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	4-10	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	10	Weathered bedrock	---	---	---	---	---	---	---	---	---
Margate---------	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
	6-17	Fine sand, sand	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
	17-35	Fine sand, sand	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
	35	Unweathered bedrock.		---	---	---	---	---	---	---	---
32*. Urban land											
33*: Urban land.											
Holopaw---------	0-57	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	70-95	2-10	---	NP
	57-62	Sandy loam, sandy clay loam, fine sandy loam.	SM, SM-SC	A-2-4	0	100	95-100	70-99	15-30	<25	NP-7
	62-80	Loamy sand, loamy fine sand, fine sand.	SM	A-2-4	0	100	95-100	70-99	11-20	---	NP
Basinger--------	0-3	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	3-25	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	25-44	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	44-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
34*:											
Urban land.											
Immokalee-------	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	6-35	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	35-49	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	70-100	5-21	---	NP
	49-50	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
Oldsmar---------	0-35	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	35-50	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	50-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2, A-4, A-6	0	100	100	80-99	25-40	25-40	5-15
	60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
35*:											
Urban land.											
Aquents.											
36*.											
Udorthents											
37--------------- Tuscawilla	0-14	Fine sand--------	SP-SM	A-3, A-2-4	0	85-100	85-100	75-90	5-12	---	NP
	14-50	Sandy clay loam, fine sandy loam.	SC	A-2, A-4, A-6	0-15	85-100	85-100	80-95	25-40	28-40	8-20
	50-80	Fine sand, sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
38*:											
Urban land.											
Matlacha--------	0-21	Gravelly fine sand.	SP-SM	A-3, A-2-4	0-15	70-85	70-85	60-80	5-12	---	NP
	21-51	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	51-54	Fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4	0	100	100	80-99	25-35	25-30	5-10
	54	Unweathered bedrock.	---	---		---	---	---	---	---	---
Boca------------	0-4	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	4-26	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	26-30	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC	A-2, A-6, A-4	0	100	100	80-100	17-40	16-37	5-20
	30	Unweathered bedrock.	---		---	---	---	---	---	---	---
39--------------- Satellite	0-3	Fine sand--------	SP	A-3	0	100	100	60-95	1-4	---	NP
	3-80	Coarse sand, sand, fine sand.	SP	A-3	0	100	100	60-95	1-4	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
40*:											
Durbin----------	0-63	Muck--- -------	PT	---	0	---	---	---	---	---	---
	63-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-2-4, A-3	0	100	100	85-95	5-15	---	NP
Wulfert---------	0-26	Muck-------------	PT	---	---	---	---	---	---	---	---
	26-40	Muck-------------	PT	---	---	---	---	---	---	---	---
	40-80	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-18	---	NP
41*: Urban land.											
Satellite-------	0-3	Fine sand--------	SP	A-3	0	100	100	60-95	1-4	---	NP
	3-80	Coarse sand, sand, fine sand.	SP	A-3	0	100	100	60-95	1-4	---	NP
42*-------------- Canaveral	0-4	Fine sand--------	SP	A-3	0	100	100	90-100	1-4	---	NP
	4-80	Fine sand, sand, coarse sand.	SP	A-3	0	70-100	70-95	65-90	1-3	--	NP
43*:											
Winder----------	0-15	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	15-18	Loamy sand, sandy loam, fine sandy loam.	SM	A-2-4	0	100	100	80-100	15-25	<35	NP-10
	18-50	Sandy clay loam	SC	A-2-4, A-2-6	0	100	100	80-100	18-35	20-40	9-26
	50-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC, GM-GC	A-2-4, A-2-6, A-1-B	0	60-100	50-95	40-90	15-35	<35	NP-20
Riviera---------	0-32	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	32-54	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	15-35	<35	NP-15
	54	Weathered bedrock	--	---	---	---	---	---	---	--	---
Chobee----------	0-13	Mucky fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	<40	NP-10
	13-47	Sandy loam, fine sandy loam, sandy clay loam.	SP-SM, SM, SC, SM-SC	A-2-4, A-2-6, A-6, A-7	0	100	100	85-100	12-45	<45	NP-25
	47-80	Fine sand, loamy sand.	SP-SM, SM	A-2-4	0	100	100	80-100	12-25	<40	NP-10
45-------------- Paola	0-3	Fine sand--------	SP	A-3	0	100	100	85-100	1-2	--	NP
	3-32	Sand, fine sand	SP	A-3	0	100	100	85-100	1-2	---	NP
	32-80	Sand, fine sand	SP	A-3	0	100	100	80-100	1-4	---	NP
48-------------- Pennsuco	0-5	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	98-100	85-95	<40	NP-19
	5-40	Silt, silt loam	ML	A-4	0	100	100	98-100	85-95	---	NP
	40-48	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	0	100	100	85-99	2-12	---	NP
	48-80	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
49*:											
Hallandale	0-3	Fine sand	SP-SM	A-3, A-2-4	0	100	100	100	5-12	---	NP
	3-12	Fine sand, sand	SP-SM	A-3, A-2-4	0	100	100	100	5-12	---	NP
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
Boca	0-4	Fine sand	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	4-26	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-95	7-15	---	NP
	26-30	Fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-4	0	100	100	80-95	25-40	25-30	5-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
50, 51 Ochopee	0-5	Fine sandy loam	SM, SM-SC	A-2-4, A-4, A-1-B	0	100	100	40-60	20-40	0-28	NP-7
	5-17	Sandy loam, fine sandy loam.	SM, SM-SC	A-2-4, A-4, A-1-B	0	100	100	40-60	20-40	0-28	NP-7
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
52 Kesson	0-5	Muck	PT	---	0	---	---	---	---	---	NP
	5-34	Sand, fine sand	SP, SP-SM	A-3	0	90-100	90-100	90-100	2-10	---	NP
	34-50	Sand, fine sand	SP, SP-SM	A-3	0	70-100	65-95	60-95	2-10	---	NP
	50-80	Sand, fine sand	SP, SP-SM	A-3	0	90-100	90-100	90-100	2-10	---	NP
53*:											
Estero	0-6	Muck	PT	---	---	---	---	---	---	---	---
	6-28	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-95	2-12	---	NP
	28-40	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-95	2-5	---	NP
	40-62	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-95	2-12	---	NP
Peckish	0-9	Mucky fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	9-37	Sand, fine sand	SP-SM	A-3	0	100	100	95-100	5-10	---	NP
	37-42	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-14	---	NP
	42-80	Sand, fine sand	SP-SM	A-3	0	100	100	95-100	5-10	---	NP
54*:											
Jupiter	0-4	Mucky fine sand	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	4-10	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	10	Weathered bedrock	---	---	---	---	---	---	---	---	---
Boca	0-4	Fine sand	SP-SM	A-3, A-2-4	0	100	100	85-100	5-12	---	NP
	4-26	Fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-95	7-15	---	NP
	26-30	Fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-4	0	100	100	80-95	25-40	25-30	5-10
	30	Unweathered bedrock.				---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
56 ---------- Basinger	0-25	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	25-37	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	37-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12. PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
2---------------- Holopaw	0-57	1-7	1.35-1.60	6.0-20	0.07-0.10	5.1-8.4	<2	Low--------	0.10	5	2	1-4
	57-62	13-28	1.60-1.70	0.2-2.0	0.15-0.20	5.1-8.4	<2	Low--------	0.20			
	62	---	---		---	---	---	----------	----			
3---------------- Malabar	0-15	0-4	1.35-1.55	6.0-20	0.03-0.08	5.1-8.4	<2	Low--------	0.10	5	2	1-2
	15-29	1-5	1.35-1.70	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.10			
	29-55	1-5	1.40-1.70	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.10			
	55-72	12-25	1.55-1.75	<0.2	0.10-0.15	5.1-8.4	<2	Low--------	0.24			
	72-80	1-8	1.40-1.70	6.0-20	0.03-0.08	5.1-8.4	<2	Low--------	0.15			
4*: Chobee----------	0-6	---	0.15-0.35	6.0-20	0.30-0.50	5.1-7.3	<2	Low--------	0.10	3	2	25-35
	6-13	7-20	1.45-1.50	2.0-6.0	0.10-0.15	5.6-7.3	<2	Low--------	0.15			
	13-45	18-35	1.50-1.70	0.06-0.2	0.12-0.17	6.1-8.4	<2	Moderate	0.32			
	45	---	---		---	---	---	----------	----			
Dania-----------	0-10	---	0.15-0.35	6.0-20	0.20-0.30	5.6-7.3	<2	Low--------	----	5	2	60-90
	10-12	2-10	1.45-1.55	6.0-20	0.02-0.10	6.6-8.4	<2	Low--------	0.10			
	12	---	---	---	---	---	---	------	----			
6*: Riviera-------	0-32	1-6	1.40-1.65	6.0-20	0.02-0.05	5.1-7.8	<2	Low--------	0.10	5	2	1-2
	32-54	12-25	1.50-1.70	0.2-6.0	0.10-0.15	6.6-7.8	<2	Low--------	0.24			
	54	---		---	---	---	---	----------	----			
Copeland--------	0-14	3-12	1.30-1.50	6.0-20	0.10-0.15	6.1-7.3	<2	Low--------	0.10	2	2	2-6
	14-18	2-10	1.35-1.55	6.0-20	0.05-0.10	6.1-7.3	<2	Low--------	0.17			
	18-24	15-30	1.55-1.70	0.6-2.0	0.10-0.15	7.4-8.4	<2	Low--------	0.24			
	24-30	10-18	1.55-1.70	0.6-6.0	0.05-0.10	7.4-8.4	<2	Low--------	0.24			
	30	---	---	---	---	---		----------	----			
7---------------- Immokalee	0-6	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	Low--------	0.10	5	2	1-2
	6-35	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low----	0.10			
	35-49	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low--------	0.15			
	49-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
8---------------- Myakka	0-7	1-3	1.25-1.45	6.0-20	0.05-0.15	3.6-6.5	<2	Low--------	0.10	5	2	2-5
	7-27	0-2	1.45-1.60	6.0-20	0.02-0.05	3.6-6.5	<2	Low--------	0.10			
	27-35	1-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	<2	Low--------	0.15			
	35-80	0-2	1.48-1.70	6.0-20	0.02-0.10	3.6-6.5	<2	Low--------	0.10			
10--------------- Oldsmar	0-35	1-3	1.40-1.65	6.0-20	0.05-0.10	4.5-6.0	<2	Low--------	0.10	5	2	1-2
	35-50	1-3	1.40-1.65	0.2-0.6	0.05-0.10	4.5-5.5	<2	Low---	0.15			
	50-60	15-35	1.50-1.70	0.06-0.2	0.10-0.15	5.1-7.8	<2	Low--------	0.24			
	60	---	---	---	---	---	---	----------	----			
11--------------- Hallandale	0-3	0-3	1.20-1.45	6.0-20	0.05-0.10	5.1-6.5	<2	Low--------	0.10	1	2	1-2
	3-12	0-5	1.45-1.65	6.0-20	0.03-0.10	5.6-8.4	<2	Low--------	0.10			
	12	---	---	---	---	---	---	----------	----			
14--------------- Pineda	0-30	1-3	1.40-1.65	6.0-20	0.02-0.05	5.6-6.5	<2	Low--------	0.15	5	2	1-2
	30-55	17-35	1.65-1.75	0.06-0.2	0.10-0.15	6.6-7.8	<2	Low--------	0.24			
	55	---	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
15--------------- Pomello	0-35	<2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	Very low	0.10	5	1	<1
	35-60	<2	1.45-1.60	2.0-6.0	0.10-0.30	4.5-6.0	<2	Very low	0.15			
	60-80	<2	1.35-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	Very low	0.10			
16--------------- Oldsmar	0 35	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-7.3	<2	Very low	0.10	5	2	1-2
	35-50	2-8	1.42-1.59	0.2-6.0	0.10-0.15	3.6-7.3	<2	Low-------	0.15			
	50-80	15-30	1.60-1.69	<0.2	0.10-0.15	6.1-8.4	<2	Low-------	0.24			
17--------------- Basinger	0-3	0-4	1.40-1.55	6.0 20	0.03-0.07	3.6-7.3	<2	Low-------	0.10	5	2	.5-2
	3-25	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low-------	0.10			
	25-44	1-6	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low-------	0.10			
	44-80	1-3	1.50 1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low-- --	0.10			
18--------------- Riviera	0-6	1-5	1.20-1.45	6.0-20	0.05-0.10	5.1-7.8	<2	Low-------	0.10	4	2	.5-4
	6-32	1 5	1.30-1.60	6.0-20	0.02-0.05	5.1-7.8	<2	Low-------	0.10			
	32 54	12-25	1.50-1.70	0.6-6.0	0.10-0.15	6.6-7.8	<2	Low-------	0.24			
	54	---	---	---	---	---	---	----------	----			
20*:												
Ft. Drum--------	0-5	1-3	1.30-1.55	6.0-20	0.05 0.10	4.5-7.3	<2	Low-------	0.10	5	2	1-2
	5-20	1-3	1.30-1.55	6.0-20	0.05-0.08	5.6-8.4	<2	Low-------	0.10			
	20-80	2-5	1.30-1.60	6.0-20	0.05-0.08	6.1-8.4	<2	Low-------	0.17			
Malabar---------	0-15	0-4	1.35-1.55	6.0-20	0.03-0.08	5.1-6.5	<2	Low -----	0.10	5	2	1-2
	15-29	1-5	1.35-1.70	6.0-20	0.05-0.10	5.1-7.3	<2	Low -----	0.10			
	29 55	1-3	1.40-1.70	6.0-20	0.03-0.05	5.1-7.3	<2	Low-------	0.10			
	55-72	12-25	1.55-1.75	<0.2	0.10-0.15	5.1-7.3	<2	Low-------	0.24			
	72-80	1-8	1.40-1.70	6.0-20	0.03-0.08	5.1-7.3	<2	Low-------	0.10			
21--------------- Boca	0-4	1-5	1.30-1.55	6.0-20	0.05-0.10	5.1-8.4	<2	Low-------	0.10	2	2	1 3
	4-26	1-5	1.50-1.60	6.0-20	0.02-0.05	5.1-8.4	<2	Low-------	0.17			
	26-30	14-30	1.55-1.65	0.6-2.0	0.10-0.15	5.1-8.4	<2	Low-------	0.20			
	30	---	---	---	---	---	---	----------	--			
22*:												
Chobee----------	0-13	10-20	1.15-1.30	2.0-6.0	0.15-0.20	5.1-7.3	<2	Low----	0.15	5	3	2-10
	13-47	10-30	1.40 1.45	<0.2	0.12-0.17	5.6-8.4	<2	Low--- -	0.15			
	47-80	0 15	1.45-1.50	2.0-6.0	0.10-0.15	5.6-7.8	<2	Low-------	0.15			
Winder-------	0-15	1-6	1.40-1.65	6.0-20	0.03-0.08	5.6-7.8	<2	Low-------	0.10	5	2	.1-2
	15-18	10-18	1.45-1.65	0.2-0.6	0.06-0.10	6.1-7.8	<2	Low-------	0.20			
	18-50	20-30	1.60-1.70	<0.2	0.10-0.15	6.6 8.4	<2	Low-------	0.24			
	50-80	15-30	1.50-1.70	<0.2	0.06-0.12	7.4-8.4	<2	Low-------	0.24			
Gator-----------	0-25	0-1	0.10-0.30	6.0-20	0.30-0.40	3.6-6.6	<2	Low-------	----	2	2	55-85
	25-80	13-20	1.60-1.70	<0.2	0.10-0.15	6.1-8.4	<2	Low-------	0.32			
23*:												
Holopaw---------	0-57	1-7	1.35-1.60	6.0-20	0.03-0.10	5.1-7.3	<2	Low-------	0.10	5	2	1-4
	57-62	13-28	1.60-1.70	0.2-2.0	0.10-0.20	5.1-8.4	<2	Low-------	0.20			
	62-80	7-13	1.50-1.60	6.0-20	0.05-0.10	5.1-8.4	<2	Low-------	0.15			
Okeelanta-------	0-20	0-1	0.10-0.30	6.0-20	0.30-0.40	3.6-5.0	<2	Low-------	----	2	2	20-80
	20-52	1-2	1.20-1.55	2.0 6.0	0.03-0.05	5.1-6.5	<2	Low-------	0.17			
	52-80	13-20	1.60 1.70	<0.2	0.10-0.15	6.1-8.4	<2	Low ------	0.32			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
25*:												
Boca	0-4	0-2	1.30-1.55	6.0-20	0.05-0.10	5.1-7.8	<2	Low	0.10	2	2	1-3
	4-26	0-2	1.50-1.60	6.0-20	0.02-0.05	5.1-8.4	<2	Low	0.10			
	26-30	15-30	1.55-1.65	0.6-2.0	0.10-0.15	5.1-8.4	<2	Low	0.20			
	30	---	---	---	---	---	---	---	---			
Riviera	0 32	1 6	1.40-1.65	6.0-20	0.02-0.05	5.1-7.8	<2	Low	0.10	5	2	.1-2
	32-54	12-25	1.50-1.70	0.2-6.0	0.10-0.15	6.6 7.8	<2	Low	0.24			
	54	--	---	---	---	---						
Copeland	0-14	3-12	1.30-1.50	6.0-20	0.10-0.15	6.1-7.3	<2	Low	0.10	2	2	2-6
	14-18	2-10	1.35-1.55	6.0-20	0.05-0.10	6.1-7.3	<2	Low	0.17			
	18-24	15-30	1.55-1.70	0.6-2.0	0.10-0.15	7.4-8.4	<2	Low	0.24			
	24-30	10-18	1.55-1.70	0.6-6.0	0.05-0.10	7.4-8.4	<2	Low	0.24			
	30	---	---	---	---	---	---	---	---			
27 Holopaw	0-57	1-7	1.35-1.60	6.0-20	0.07-0.10	5.1-7.3	<2	Low	0.10	5	2	1-4
	57 62	13 28	1.60-1.70	0.2-2.0	0.15-0.20	5.1-8.4	<2	Low	0.20			
	62-80	7-13	1.50 1.60	6.0 20	0.05-0.10	5.1-8.4	<2	Low	0.15			
28*:												
Pineda	0-4	1-6	1.25-1.60	6.0-20	0.05-0.10	4.5-7.3	<2	Low	0.10	5	2	.5-6
	4-30	1-8	1.40-1.70	6.0-20	0.02-0.05	4.5-7.3	<2	Low	0.10			
	30-55	10-25	1.50-1.70	<0.2	0.10-0.15	5.1-8.4	<2	Low	0.24			
	55-80	3-12	1.45-1.60	2.0-6.0	0.02-0.05	5.6-8.4	<2	Low	0.10			
Riviera	0-32	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	<2	Low	0.10	4	2	.1-2
	32 54	12 25	1.50 1.70	<0.2	0.10-0.14	6.1-8.4	<2	Low	0.24			
	54-80	15-25	1.50-1.70	<0.2	0.12 0.15	6.1 8.4	<2	Low	0.24			
29 Wabasso	0-6	1-5	1.25-1.45	6.0 20	0.03 0.08	3.6 6.5	<2	Low	0.10	5	2	1-4
	6-28	0-5	1.35-1.55	6.0-20	0.02-0.05	3.6-6.5	<2	Low	0.10			
	28-35	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low	0.15			
	35-70	12-30	1.60-1.75	<0.2	0.10-0.15	5.1-8.4	<2	Low	0.24			
	70-80	2-12	1.40-1.70	6.0-20	0.05-0.10	7.4-8.4	<2	Low	0.10			
31*:												
Hilolo	0-12	3-8	1.35-1.45	6.0-20	0.05-0.10	6.6-8.4	<2	Low	0.10	4	2	1-5
	12-20	12-25	1.55-1.75	0.6-20	0.08-0.12	7.4-8.4	<2	Low	0.24			
	20-35	20-35	1.60-1.75	0.2-2.0	0.10-0.15	7.4-8.4	<2	Low	0.24			
	35 50	12 25	1.55-1.60	0.2-2.0	0.10-0.15	7.4-9.0	<2	Low	0.24			
	50 61	5 18	1.40 1.60	0.06-0.2	0.05-0.10	7.4-9.0	<2	Low	0.20			
	61	---	---	---	---	--		---	---			
Jupiter	0-4	2-8	1.35-1.50	6.0-20	0.10-0.15	6.1-8.4	<2	Low	0.10	2	2	1-5
	4-10	2-8	1.35-1.50	6.0-20	0.12-0.18	6.1-8.4	<2	Low	0.10			
	10	---	---	---	---	---	---	---	---			
Margate	0-6	1-4	1.25-1.45	6.0-20	0.05-0.10	4.5-6.0	<2	Low	0.10	2	2	1-4
	6-17	0-4	1.55-1.65	6.0-20	0.03-0.06	5.1-6.5	<2	Low	0.10			
	17-35	1-4	1.55 1.65	6.0 20	0.03 0.06	6.1 7.8	<2	Low	0.10			
	35	---	---	---	---	---			---			
32*. Urban land												
33*: Urban land.												

See footnote at end of table.

TABLE 12. PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
33*:												
Holopaw----------	0-57	1-7	1.35-1.60	6.0-20	0.07-0.10	5.1-7.3	<2	Low--------	0.10	5	2	1-4
	57-62	13-28	1.60-1.70	0.2-2.0	0.15-0.20	5.1-8.4	<2	Low--------	0.20			
	62-80	7-13	1.50-1.60	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.15			
Basinger---------	0-3	0-4	1.40-1.55	6.0-20	0.03-0.07	3.6-8.4	<2	Low--------	0.10	5	2	.5-2
	3-25	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low--------	0.10			
	25-44	1-6	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low--------	0.10			
	44-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low	0.10			
34*:												
Urban land.												
Immokalee--------	0-6	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	Low--------	0.10	5	2	1-2
	6-35	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low--------	0.10			
	35-49	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low--------	0.15			
	49-50	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Low---	0.10			
Oldsmar----------	0-35	1-3	1.40-1.65	6.0-20	0.05-0.10	4.5-6.0	<2	Low-----	0.10	5	2	1-2
	35-50	1-3	1.40-1.65	0.2-0.6	0.05-0.10	4.5-5.5	<2	Low--------	0.15			
	50-60	15-35	1.50-1.70	0.06-0.2	0.10-0.15	5.1-7.8	<2	Low--------	0.24			
	60	---	---		---	---	---	-----------	----			
35*:												
Urban land.												
Aquents.												
36*.												
Udorthents												
37--------------- Tuscawilla	0-14	1-5	1.10-1.40	6.0-20	0.05-0.10	5.6-8.4	<2	Low--------	0.10	5	2	1-3
	14-50	14-30	1.25-1.55	0.6-2.0	0.08-0.12	6.6-9.0	<2	Low--------	0.24			
	50-80	1-7	1.55-1.70	6.0-20	0.03-0.08	7.4-9.0	<2	Low ------	0.10			
38*:												
Urban land.												
Matlacha---------	0-21	3-8	1.65-1.75	2.0-6.0	0.05-0.10	5.6-8.4	<2	Low--------	0.10	5	2	---
	21-51	1-2	1.40-1.65	6.0-20	0.03-0.05	5.6-7.3	<2	Low--------	0.17			
	51-54	15-25	1.50-1.70	0.2-0.6	0.10-0.15	6.6-8.4	<2	Low--- ---	0.20			
	54	---	---		---	---	---	-----------	---			
Boca-------------	0-4	1-5	1.30-1.55	6.0-20	0.05-0.10	5.1-8.4	<2	Low--------	0.10	2	2	1-3
	4-26	1-5	1.50-1.60	6.0-20	0.02-0.05	5.1-8.4	<2	Low--------	0.17			
	26-30	14-30	1.55-1.65	0.6-2.0	0.10-0.15	5.1-8.4	<2	Low--------	0.20			
	30	---	---	---	---	---	---	-----------	----			
39--------------- Satellite	0-3	1-3	1.10-1.45	>20	0.02-0.10	4.5-7.8	<2	Low -----	0.10	5	2	.5-2
	3-80	0-2	1.35-1.55	>20	0.02-0.05	4.5-7.8	<2	Low--------	0.10			
40*:												
Durbin-----------	0-63	---	0.20-0.50	6.0-20	0.20-0.25	3.6-7.3	>16	Low--------	----	2	2	40-65
	63-80	2-5	1.30-1.45	6.0-20	0.10-0.15	3.6-8.4	>16	Low--------	0.10			
Wulfert----------	0-26	0-1	0.20-0.40	6.0-20	0.20-0.25	5.6-7.3	>16	----------	----	2	2	---
	26-40	1-5	0.30-0.40	6.0-20	0.10-0.15	3.6-7.3	>16	-----------	----			
	40-80	2-5	1.50-1.60	6.0-20	0.02-0.08	3.6-7.3	>16	Low--------	0.17			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
41*:												
Urban land.												
Satellite	0-3	1-3	1.10-1.45	>20	0.02-0.10	4.5-7.8	<2	Low	0.10	5	2	.5-2
	3-80	0-2	1.35 1.55	>20	0.02-0.05	4.5-7.8	<2	Low	0.10			
42* Canaveral	0-4	<2	1.25-1.50	>6.0	0.02-0.05	6.6-8.4	<2	Very low	0.10	5	2	<2
	4-80	<2	1.25-1.50	>6.0	0.02-0.05	6.6-8.4	<2	Very low	0.10			
43*:												
Winder	0-15	1-6	1.40-1.65	6.0-20	0.03-0.08	5.6-7.8	<2	Low	0.10	5	2	.1-2
	15-18	10-18	1.45-1.65	0.2-0.6	0.06-0.10	6.1-7.8	<2	Low	0.20			
	18-50	20-30	1.60-1.70	<0.2	0.10-0.15	6.6-8.4	<2	Low	0.24			
	50-80	15-30	1.50-1.70	<0.2	0.06-0.12	7.4-8.4	<2	Low	0.24			
Riviera	0-32	1-6	1.40 1.65	6.0 20	0.02-0.05	5.1-7.8	<2	Low	0.10	5	2	.1-2
	32-54	12-25	1.50-1.70	0.2-6.0	0.10 0.15	6.6 7.8	<2	Low	0.24			
	54	---	---	---	---	---	---	---	---			
Chobee	0-13	2-8	1.25-1.45	6.0-20	0.15-0.25	5.1-7.3	<2	Low	0.10	5	2	10-20
	13-47	10-30	1.40-1.45	<0.2	0.12-0.17	5.6-8.4	<2	Low	0.15			
	47-80	0-15	1.45-1.50	2.0-6.0	0.10-0.15	5.6-7.8	<2	Low	0.15			
45 Paola	0-3	0-2	1.20-1.45	>20	0.02-0.05	3.6-7.3	<2	Low	0.10	5	1	<.5
	3-32	0-2	1.45-1.60	>20	0.02-0.05	3.6-7.3	<2	Low	0.10			
	32-80	0-3	1.45 1.60	>20	0.02-0.05	3.6-7.3	<2	Low	0.10			
48 Pennsuco	0-5	15-30	1.00-1.20	0.2-2.0	0.15-0.20	7.9-8.4	<4	Low	0.32	3	4L	3-6
	5-40	2-18	0.95-1.05	0.6-6.0	0.20-0.45	7.9-8.4	<4	Low	0.32			
	40-48	1-8	1.40-1.60	6.0-20	0.10-0.20	6.6-8.4	<4	Low	0.15			
	48-80	---	---	---	---	---	---	---	---			
49*:												
Hallandale	0-3	0-3	1.20-1.45	6.0-20	0.05-0.10	5.1-7.3	<2	Low	0.10	1	2	1-2
	3-12	0-5	1.45-1.65	6.0-20	0.03-0.10	5.6-8.4	<2	Low	0.10			
	12	---	---	---	---	---	---	---	---			
Boca	0-4	1-2	1.35-1.45	6.0-20	0.05-0.10	5.6-7.3	<2	Low	0.10	2	2	1-3
	4-26	1-2	1.40-1.65	6.0-20	0.03 0.05	6.6 8.4	<2	Low	0.10			
	26-30	15-25	1.65-1.75	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low	0.20			
	30	---	---	---	---	---	---	---	---			
50, 51 Ochopee	0-5	5-15	1.30-1.50	2.0-6.0	0.10-0.22	7.9-9.0	<2	Low	0.17	1	3	2-5
	5-17	5-15	1.30-1.50	2.0-6.0	0.10-0.22	7.9-9.0	<2	Low	0.17			
	17	---	---	---	---	---	---	---	---			
52 Kesson	0-5	---	0.15-0.35	6.0-20	0.30-0.50	7.4-9.0	>16	Low	0.10	5	2	25-35
	5-34	1-4	1.50-1.65	2.0-20	0.05-0.10	7.4-9.0	>16	Low	0.10			
	34-50	1-4	1.55-1.70	2.0-20	0.05-0.15	7.4-9.0	>16	Low	0.10			
	50-80	2-8	1.45-1.65	2.0 20	0.05 0.15	7.4 9.0	>16	Low	0.10			
53*:												
Estero	0-6	---	0.25-0.35	6.0-20	0.20-0.35	6.6-8.4	>16	Low	----	2	2	---
	6-28	1-6	1.55-1.70	6.0-20	0.10-0.15	6.6-8.4	>16	Low	0.10			
	28-40	2-7	1.60-1.70	6.0-20	0.07-0.13	6.6-8.4	>16	Low	0.10			
	40-62	2-7	1.55-1.65	2.0-6.0	0.10-0.15	4.5-5.5	>16	Low	0.10			
Peckish	0-9	1-3	1.20-1.45	6.0-20	0.15-0.20	3.6-8.4	>16	Low	0.10	5	2	---
	9-37	1-5	1.40-1.55	6.0-20	0.05-0.10	3.6-8.4	>16	Low	0.10			
	37-42	2 8	1.55 1.70	6.0-20	0.10-0.15	3.6-8.4	>16	Low	0.10			
	42-80	1-4	1.55-1.70	6.0-20	0.05-0.10	3.6-8.4	>16	Low	0.10			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
54*:												
Jupiter----------	0-4	2-8	1.15-1.25	6.0-20	0.15-0.20	6.1-8.4	<2	Low-------	0.10	--	--	6-15
	4-10	2-8	1.35-1.50	6.0-20	0.12-0.18	6.1-8.4	<2	Low-------	0.10			
	10	---	---	---	---	---	---	---------	----			
Boca------------	0-4	1-2	1.35-1.45	6.0-20	0.05-0.10	5.6-7.3	<2	Low-------	0.10	2	2	1-3
	4-26	1-2	1.40-1.65	6.0-20	0.03-0.05	6.6-8.4	<2	Low-------	0.10			
	26-30	15-25	1.65-1.75	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low-------	0.20			
	30	---	---	---	---	---	---	----------	----			
56--------------- Basinger	0-25	0-4	1.40-1.55	6.0-20	0.03-0.07	3.6-7.3	<2	Low-------	0.10	5	2	.2-1
	25-37	1-6	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low-----	0.10			
	37-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low----	0.10			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock depth	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In		
2---------- Holopaw	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	50-80	High------	Moderate.
3--------------- Malabar	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	>60	High------	Low.
4*:										
Chobee---------	D	None--------	---	---	+2-0	Apparent	Jun-Mar	40-60	High------	Low.
Dania----	B/D	None--------	---	---	+1-1.0	Apparent	Jun-Feb	8-20	High------	Moderate.
6*:										
Riviera--------	D	None--------	---	---	+2-1.0	Apparent	Jun-Feb	40-70	High	High.
Copeland-------	B/D	None--------	---	---	0-1.0	Apparent	Jul-Feb	20-50	High------	Low.
7--------------- Immokalee	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	>60	High------	High.
8- ------- Myakka	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	>60	High------	High.
10-------------- Oldsmar	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	60 72	High	Low.
11-------------- Hallandale	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	7-20	High ----	Low.
14-------------- Pineda	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	40-80	High------	Low.
15 ------ Pomello	C	None--------	---	---	2.0-3.5	Apparent	Jul-Nov	>60	Low-------	High.
16-------------- Oldsmar	B/D	None--------	---	---	0-1.0	Apparent	Jun-Feb	>60	Moderate	High.
17-------------- Basinger	B/D	None--------	---	---	0-1.0	Apparent	Jun Feb	>60	High----	Moderate.
18-------------- Riviera	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	40-70	High------	Moderate.
20*:										
Ft. Drum	C	None			0 1.0	Apparent	Jun Nov	>60	High------	Low.
Malabar--------	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	>60	High---- -	Low.
21-------------- Boca	B/D	None--------	---	---	0.5-1.5	Apparent	Jun-Feb	24-40	High------	Moderate.
22*:										
Chobee---------	D	None--------	---	---	+2.-1.0	Apparent	Jun-Dec	>60	High------	High.
Winder---------	D	None--------	---	---	+2-1.0	Apparent	Jun-Dec	>60	High------	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock depth	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft			In		
22*:										
Gator	D	None	---	---	+2-1.0	Apparent	Jun-Dec	>60	High	High.
23*:										
Holopaw	D	None	--	---	+2-1.0	Apparent	Jun-Apr	>60	High	Moderate.
Okeelanta	D	None	---	---	+2.-1.0	Apparent	Jun-Dec	>60	High	High.
25*:										
Boca	D	None	---	---	+2-0	Apparent	Jun-Feb	24-40	High	Moderate.
Riviera	D	None	---	---	+2-1.0	Apparent	Jun-Feb	40-70	High	High.
Copeland	D	None	---	---	+2-1.0	Apparent	Jul-Apr	20-50	High	Low.
27 Holopaw	B/D	None		---	0-1.0	Apparent	Jun-Nov	>60	High	Moderate.
28*:										
Pineda	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	>60	High	Low.
Riviera	C/D	None	---	---	0-1.0	Apparent	Jun-Dec	>60	High	High.
29 Wabasso	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	>60	Moderate	High.
31*:										
Hilolo	D	None	---	---	0-1.0	Apparent	Jun-Oct	>40	High	Low.
Jupiter	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	10-20	High	Low.
Margate	B/D	None	---	---	+1-1.0	Apparent	Jun-Feb	20-40	High	Moderate.
32*. Urban land										
33*:										
Urban land.										
Holopaw	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	>60	High	Moderate.
Basinger	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	>60	High	Moderate.
34*:										
Urban land.										
Immokalee	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	>60	High	High.
Oldsmar	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	60-72	High	Low.
35*:										
Urban land.										
Aquents.										
36*. Udorthents										
37 Tuscawilla	D	None	-	---	0-1.0	Apparent	Jul-Sep	>60	High	Low.

See footnote at end of table.

TABLE 13. SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock depth	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In		
38*:										
Urban land.										
Matlacha	C	None	---	---	2.0-3.0	Apparent	Jun-Oct	>40	High	Low.
Boca	B/D	None	--	---	0.5-1.5	Apparent	Jun-Feb	24-40	High	Moderate.
39 Satellite	C	None	---	---	1.5-3.5	Apparent	Jun-Nov	>60	Low	Moderate.
40*:										
Durbin	D	Frequent	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	>60	High	High.
Wulfert	D	Frequent	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	>60	High	High.
41*:										
Urban land.										
Satellite	C	None	---	---	1.5-3.5	Apparent	Jun-Nov	>60	Low	Moderate.
42* Canaveral	C	None	---	---	1.5-3.0	Apparent	Jun-Nov	>60	Moderate	Low.
43*:										
Winder	D	None	---	---	+2-1.0	Apparent	Jun-Dec	>60	High	Low.
Riviera	D	None	---	---	+2 1.0	Apparent	Jun-Feb	40-70	High	High.
Chobee	D	None	---	---	+2.-1.0	Apparent	Jun-Dec	>60	High	High.
45 Paola	A	None	---	---	>6.0	---	---	>60	Low	High.
48 Pennsuco	D	None	---	---	0-1.0	Apparent	Jun-Nov	40-72	High	Low.
49*:										
Hallandale	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	7-20	High	Low.
Boca	B/D	None	---	---	0-1.0	Apparent	Jun Oct	24-40	High	Moderate.
50, 51 Ochopee	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	6-20	High	Low.
52 Kesson	D	Frequent	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	>60	High	Low.
53*:										
Estero	D	Frequent	Very long	Jan-Dec	0-1.0	Apparent	Jan-Dec	>60	High	High.
Peckish	D	Frequent	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	>60	High	High.
54*:										
Jupiter	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	10-20	High	Low.
Boca	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	24-40	High	Moderate.
56 Basinger	D	Occasional	Long	Jul-Sep	0-1.0	Apparent	Jun-Feb	>60	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Aquents	Aquents
Basinger	Siliceous, hyperthermic Spodic Psammaquents
Boca	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Canaveral	Hyperthermic, uncoated Aquic Quartzipsamments
Chobee	Fine-loamy, siliceous, hyperthermic Typic Argiaquolls
Copeland	Fine-loamy, siliceous, hyperthermic Typic Argiaquolls
Dania	Euic, hyperthermic, shallow Lithic Medisaprists
Durbin	Euic, hyperthermic Typic Sulfihemists
Estero	Sandy, siliceous, hyperthermic Typic Haplaquods
Ft. Drum	Sandy, siliceous, hyperthermic Aeric Haplaquepts
Gator	Loamy, siliceous, euic, hyperthermic Terric Medisaprists
Hallandale	Siliceous, hyperthermic Lithic Psammaquents
Hilolo	Fine-loamy, siliceous, hyperthermic Mollic Ochraqualfs
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Immokalee	Sandy, siliceous, hyperthermic Arenic Haplaquods
Jupiter	Sandy, siliceous, hyperthermic Lithic Haplaquolls
Kesson	Siliceous, hyperthermic Typic Psammaquents
Malabar	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Margate	Siliceous, hyperthermic Mollic Psammaquents
Matlacha	Sandy, siliceous, hyperthermic Alfic Udarents
Myakka	Sandy, siliceous, hyperthermic Aeric Haplaquods
Ochopee	Loamy, siliceous (calcareous), hyperthermic Lithic Haplaquepts
Okeelanta	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists
Oldsmar	Sandy, siliceous, hyperthermic Alfic Arenic Haplaquods
Paola	Hyperthermic, uncoated Spodic Quartzipsamments
Peckish	Sandy, siliceous, hyperthermic Typic Sulfaquents
Pennsuco	Coarse-silty, carbonatic, hyperthermic Typic Fluvaquents
Pineda	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods
Riviera	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Satellite	Hyperthermic, uncoated Aquic Quartzipsamments
Tuscawilla	Fine-loamy, siliceous, hyperthermic Typic Ochraqualfs
Udorthents	Udorthents
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods
Winder	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs
Wulfert	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Sulfihemists

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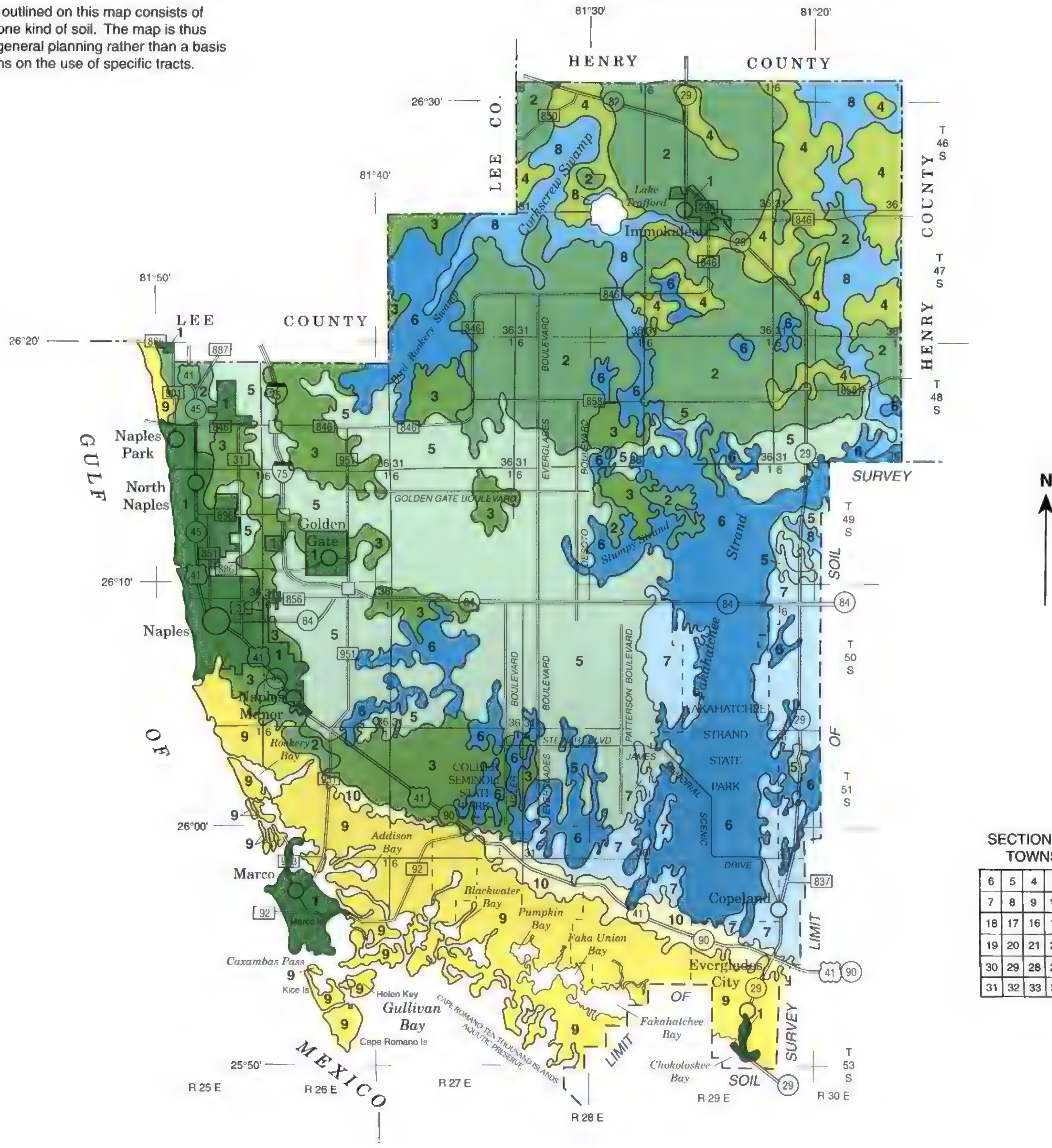
Each area outlined on this map consists of more that one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND*

URBAN LAND AND SOILS IN URBAN AREAS

1 Urban land-Udorthents-Holopaw-Immokalee

SOILS ON THE FLATWOODS AND HAMMOCKS AND IN SLOUGHS

2 Immokalee-Oldsmar-Basinger

3 Holopaw-Malabar-Basinger-Immokalee

4 Holopaw-Wabasso-Winder

5 Pineda-Boca-Hallandale

SOILS ON PRAIRIES AND IN SWAMPS, AND FRESHWATER MARSHES

6 Boca-Riviera-Copeland

7 Ochopee-Pennsuco

8 Winder-Riviera-Chobee

SOILS IN TIDAL AREAS

9 Durbin-Wulfert-Canaveral

10 Kesson-Estero-Peckish

*The units described on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1991

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
UNIVERSITY OF FLORIDA
INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES
AGRICULTURAL EXPERIMENT STATIONS
SOIL SCIENCE DEPARTMENT
FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

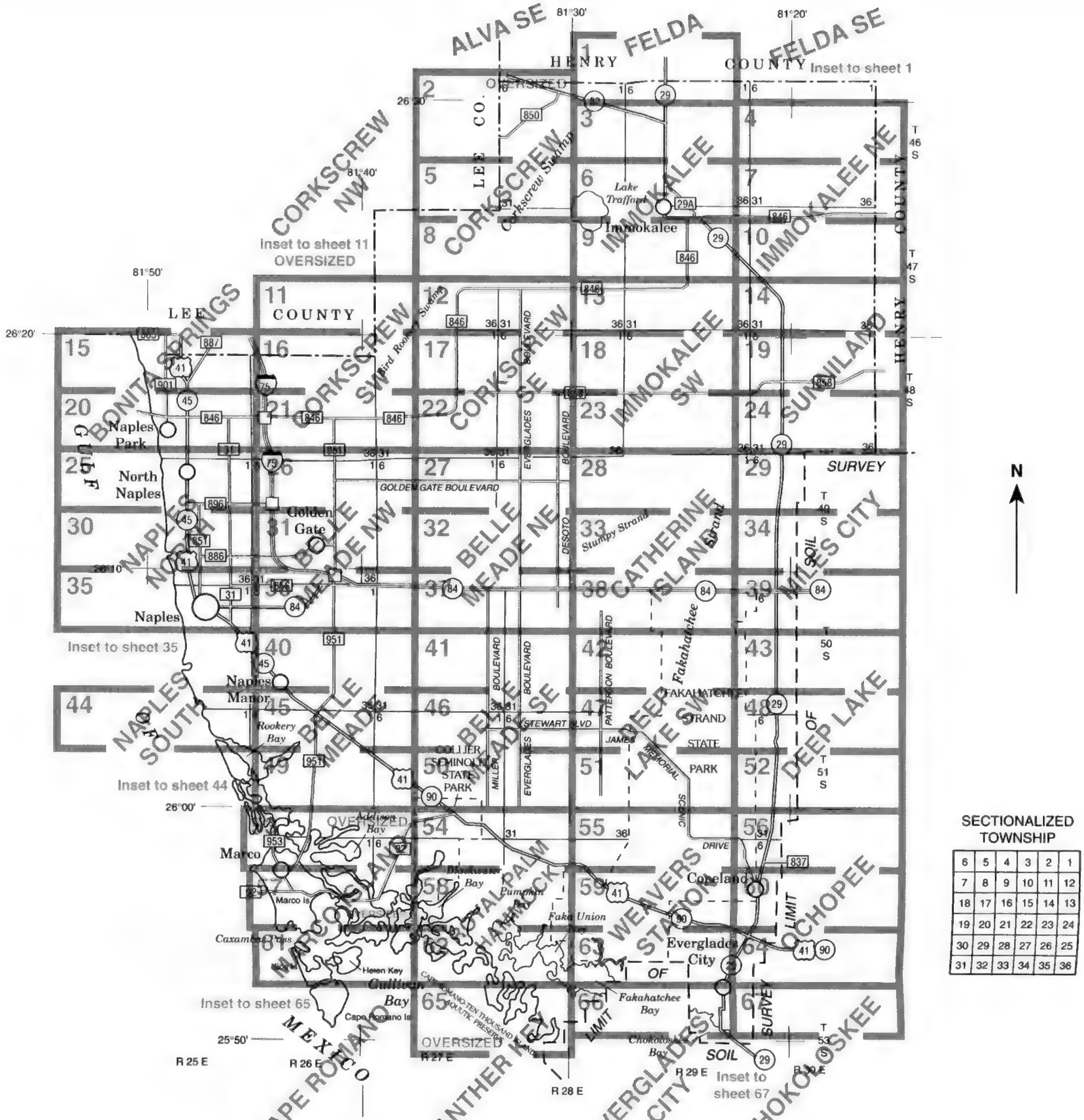
GENERAL SOIL MAP

COLLIER COUNTY AREA, FLORIDA

Scale 1 : 380,160

1 0 1 2 3 4 5 6 Miles

1 0 6 12 Km



6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Original text from each map sheet:
"This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey from 1984 - 1986 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

INDEX TO MAP SHEETS

COLLIER COUNTY AREA, FLORIDA

Scale 1 : 380,160

1 0 1 2 3 4 5 6 Miles

1 0 6 12 Km

SOIL LEGEND

The publication symbols are numerical. An alphabetical legend will also be shown on the legend page preceding the map sheets. Soil map unit names without a slope phase are either nearly level, or they are miscellaneous areas.

SYMBOL	NAME
2	Holopaw fine sand, limestone substratum
3	Malabar fine sand
4	Chobee, limestone substratum, and Dania mucks, depressional
6	Rivierla, limestone substratum-Copeland fine sands
7	Immokalee fine sand
8	Myakka fine sand
10	Oldsmar fine sand, limestone substratum
11	Hallandale fine sand
14	Pineda fine sand, limestone substratum
15	Pomello fine sand
16	Oldsmar fine sand
17	Basinger fine sand
18	Rivieria fine sand, limestone substratum
20	Ft. Drum and Malabar, high, fine sands
21	Boca fine sand
22	Chobee, Winder, and Gator soils, depressional
23	Holopaw Okeelanta soils, depressional
25	Boca, Rivieria, limestone substratum, and Copeland fine sands, depressional
27	Holopaw fine sand
28	Pineda and Riveria fine sands
29	Wabasso fine sand
31	Hilolo, Jupiter, and Margate fine sands
32	Urban land
33	Urban land-Holopaw-Basinger complex
34	Urban land-Immokolee-Oldsmar, limestone substratum, complex
35	Urban land-Aquents complex, organic substratum
36	Udorthents, shaped
37	Tuscawilla fine sand
38	Urban land-Matlacha-Boca complex
39	Satellite fine sand
40	Durbin and Wulfert mucks, frequently flooded
41	Urban land-Satellite complex
42	Canaveral-Beaches complex
43	Winder, Riviera, limestone substratum, and Chobee soils, depressional
45	Paola fine sand, gently rolling
48	Pennsuco silt loam
49	Hallandale and Boca fine sands
50	Ochopee fine sandy loam, low
51	Ochopee fine sandy loam
52	Kesson muck, frequently flooded
53	Estero and Peckish soils, frequently flooded
54	Jupiter-Boca complex
56	Basinger fine sand, occasionally flooded

SYMBOL	NAME
17	Basinger fine sand
56	Basinger fine sand, occasionally flooded
21	Boca fine sand
25	Boca, Riviera, limestone substratum, and Copeland fine sands, depressional
42	Canaveral-Beaches complex
4	Chobee, limestone substratum, and Dania mucks, depressional
22	Chobee, Winder, and Gator soils, depressional
40	Durbin and Wulfert mucks, frequently flooded
53	Estero and Peckish soils, frequently flooded
20	Ft. Drum and Malabar, high, fine sands
11	Hallandale fine sand
49	Hallandale and Boca fine sands
31	Hilolo, Jupiter, and Margate fine sands
27	Holopaw fine sand
2	Holopaw fine sand, limestone substratum
23	Holopaw and Okeelanta soils, depressional
7	Immokalee fine sand
54	Jupiter-Boca complex
52	Kesson muck, frequently flooded
3	Malabar fine sand
8	Myakka fine sand
51	Ochopee fine sandy loam
50	Ochopee fine sandy loam, low
16	Oldsmar fine sand
10	Oldsmar fine sand, limestone substratum
45	Paola fine sand, gently rolling
48	Pennsuco silt loam
14	Pineda fine sand, limestone substratum
28	Pineda and Riviera fine sands
15	Pomello fine sand
18	Riviera fine sand, limestone substratum
6	Riviera, limestone substratum-Copeland fine sands
39	Satellite fine sand
37	Tuscawilla fine sand
36	Udorthents, shaped
32	Urban land
35	Urban land-Aquents complex, organic substratum
33	Urban land-Holopaw-Basinger complex
34	Urban land-Immokolee-Oldsmar, limestone substratum, complex
38	Urban land-Matlacha-Boca complex
41	Urban land-Satellite complex
29	Wabasso fine sand
43	Winder, Riviera, limestone substratum, and Chobee soils, depressional

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County or parish
- Field sheet matchline and neatline
- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

LAKES, PONDS AND RESERVOIRS

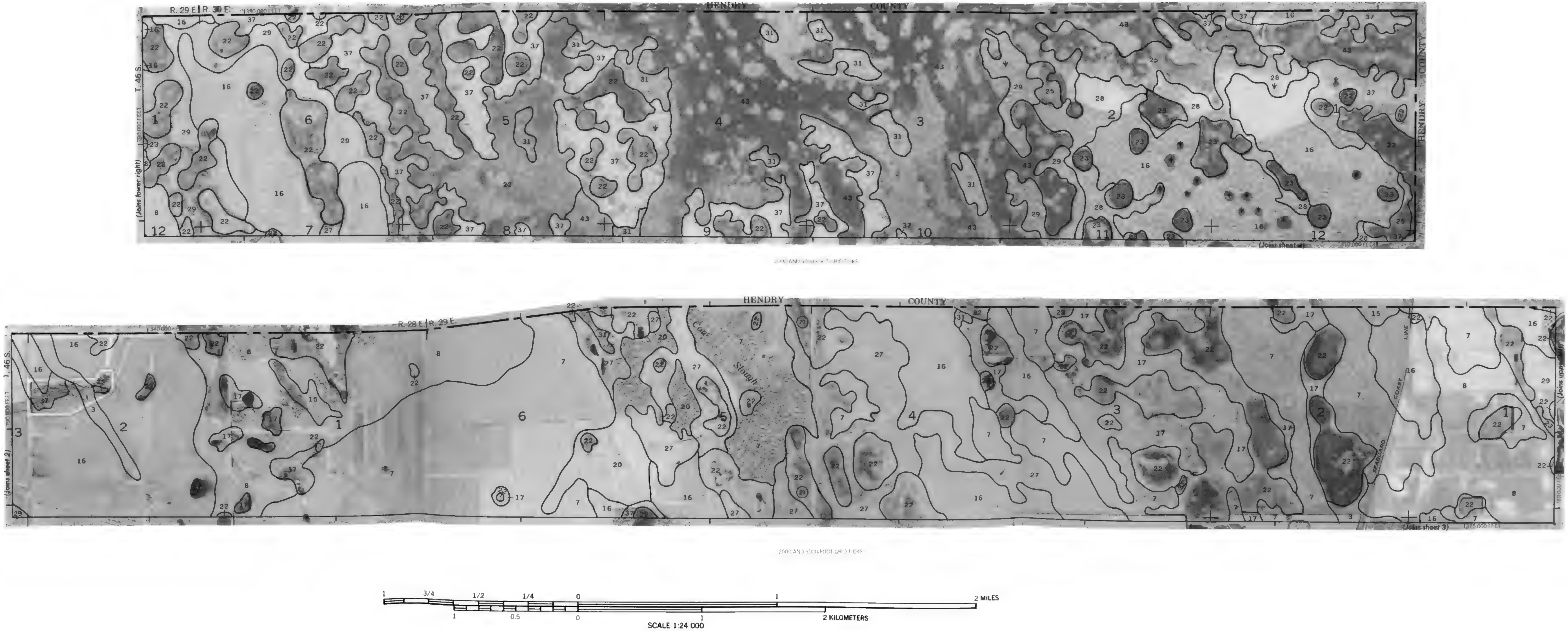
- Perennial
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

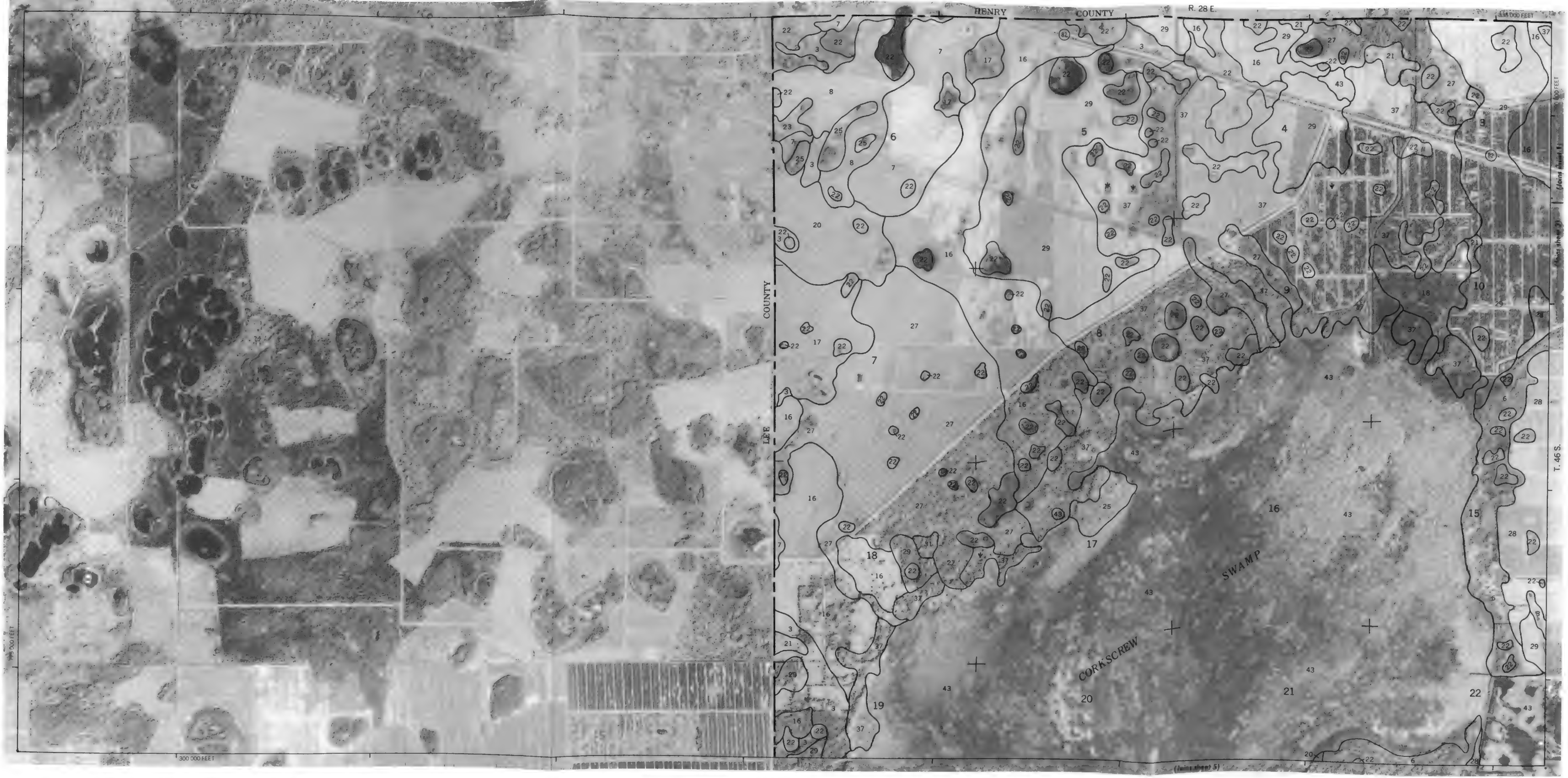
SOIL DELINEATIONS AND SYMBOLS

DEPRESSION

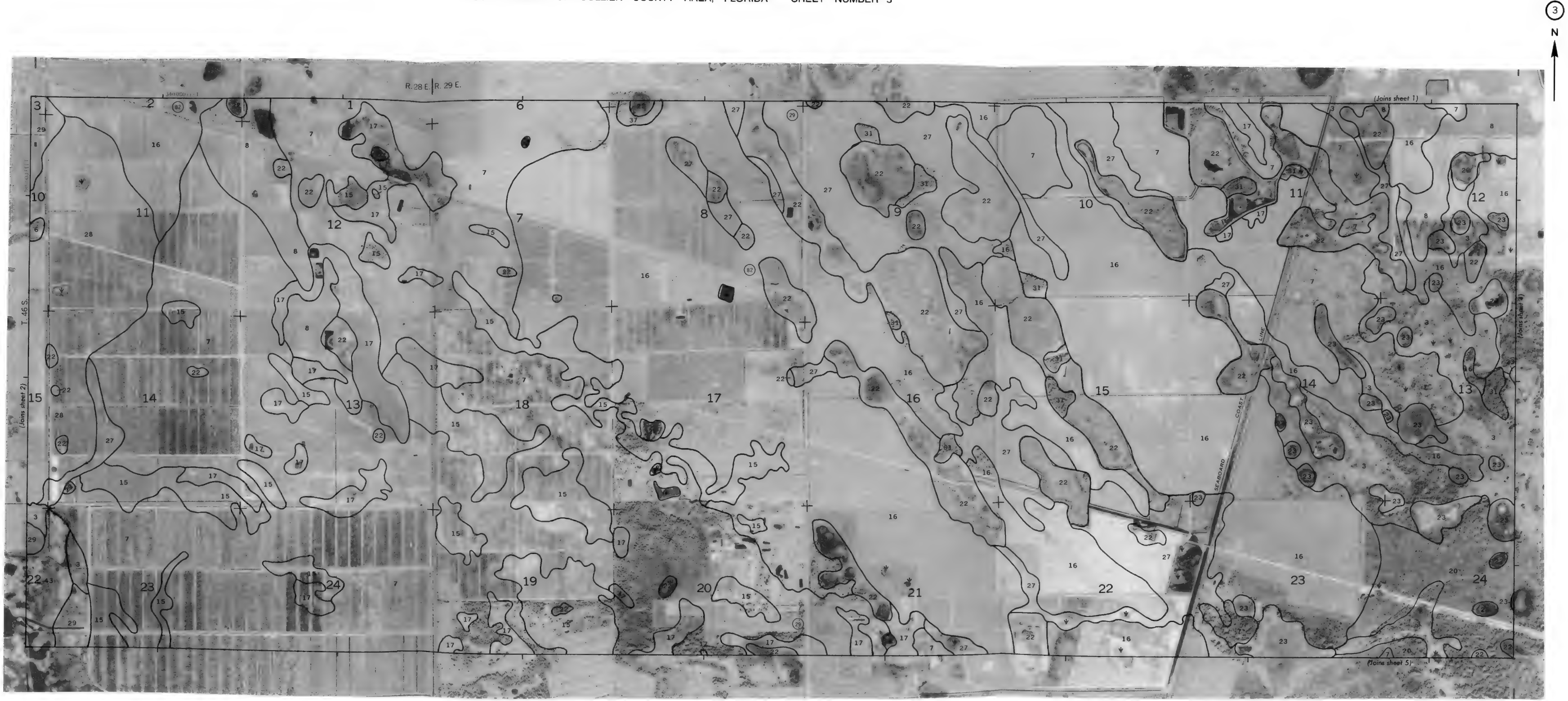
SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 1



SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 2



SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 3



SCALE 1:24 000

④

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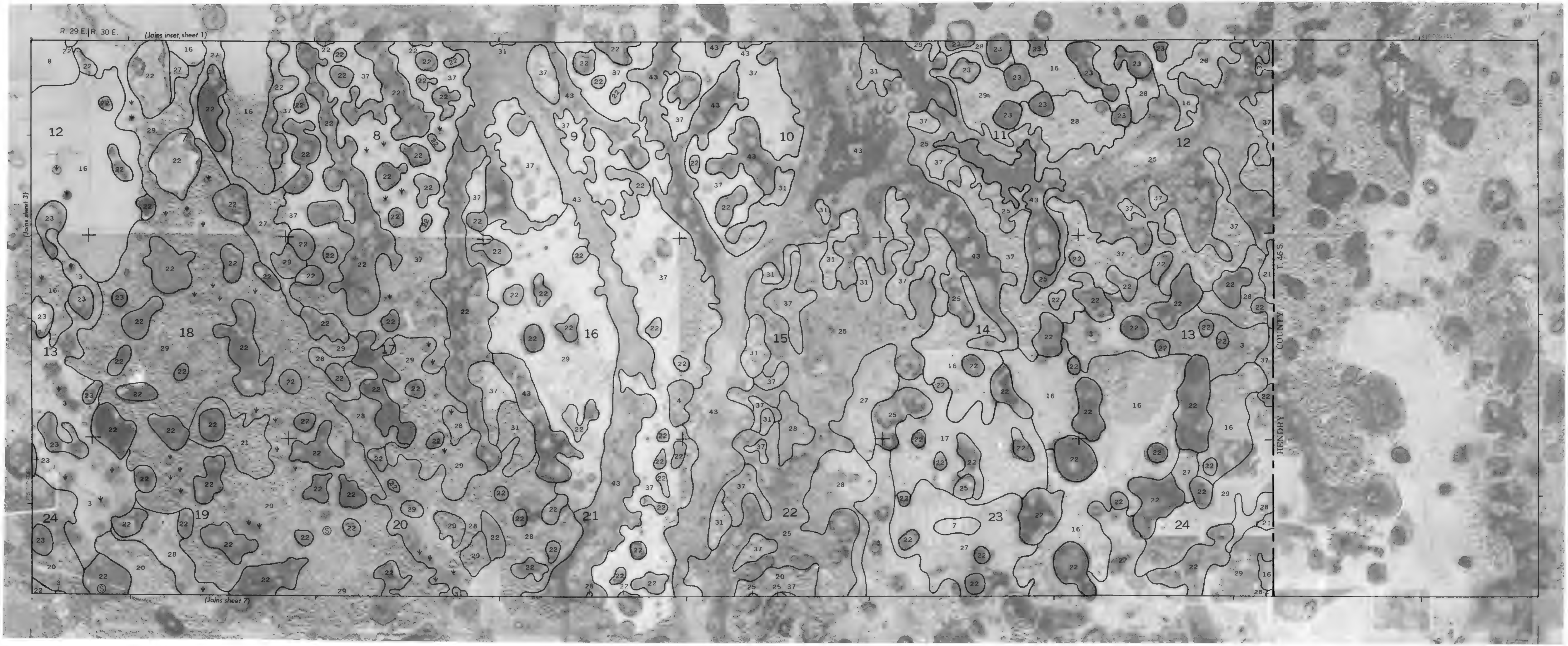
SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 4



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

5


N
R. 27 E. | R. 28 E.
(Joins sheet 2)
(Joins sheet 6)
(Joins sheet 8)
(Joins inset, sheet 11)
T. 46 S.
T. 47 S.
LEE COUNTY
LEE COUNTY
CORKSCREW SWAMP
BIG HAMMOCK
LAKE TRAFFORD
Ruess Island
Hogan Island
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 6

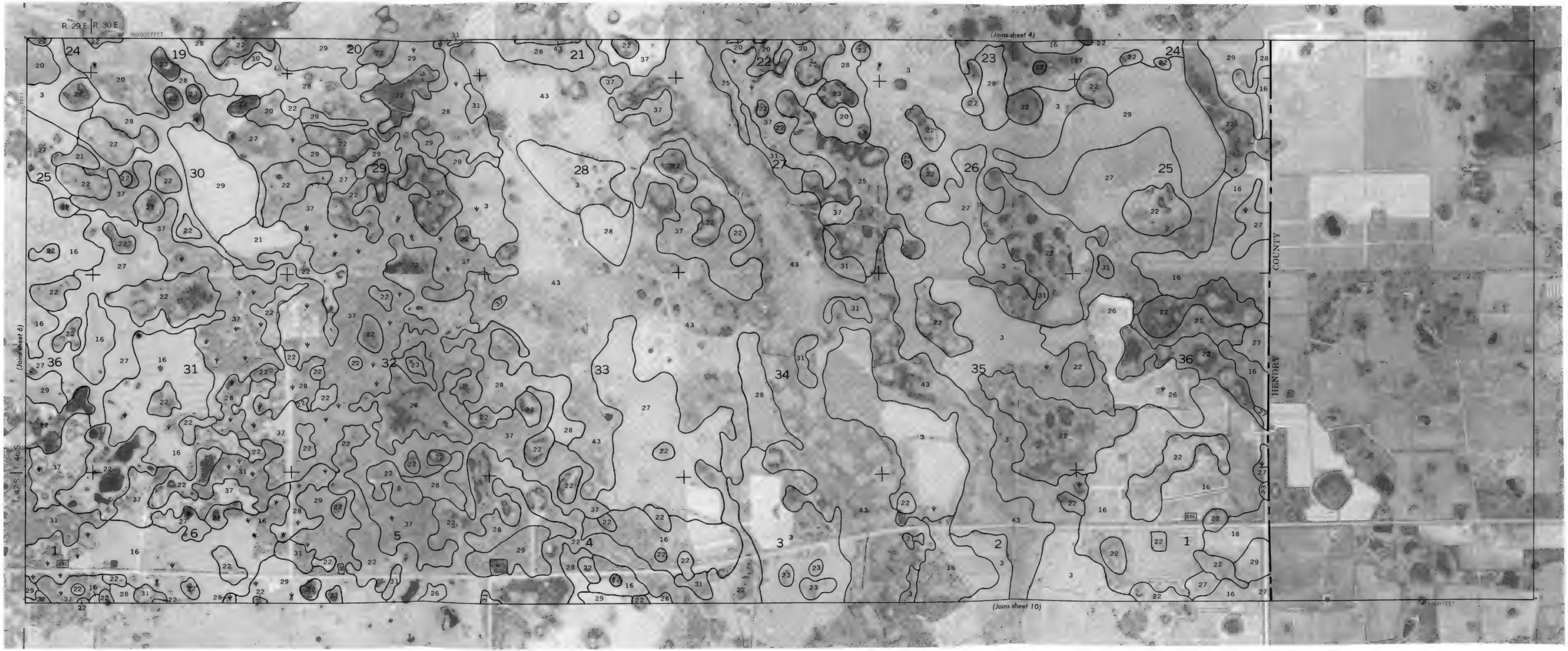
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

7

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

8

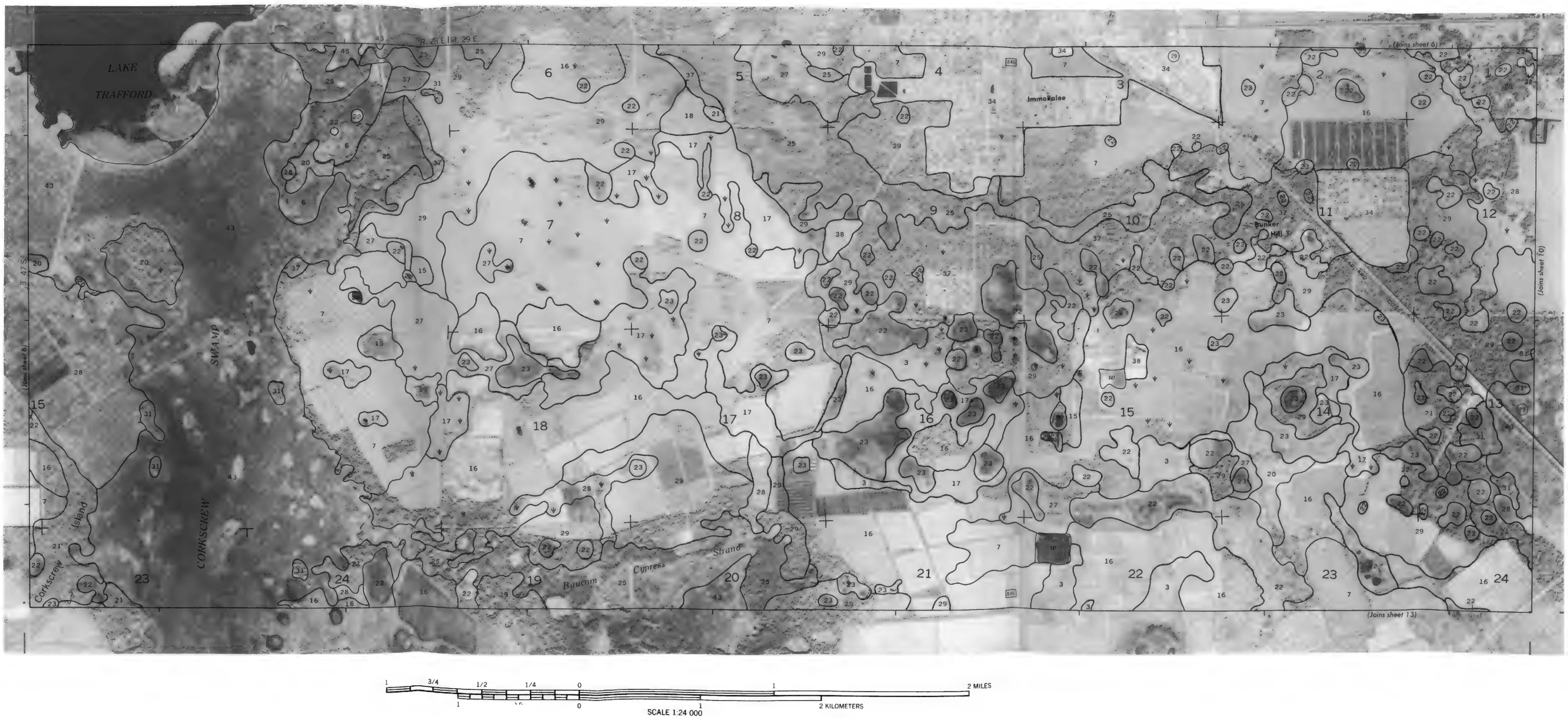
N

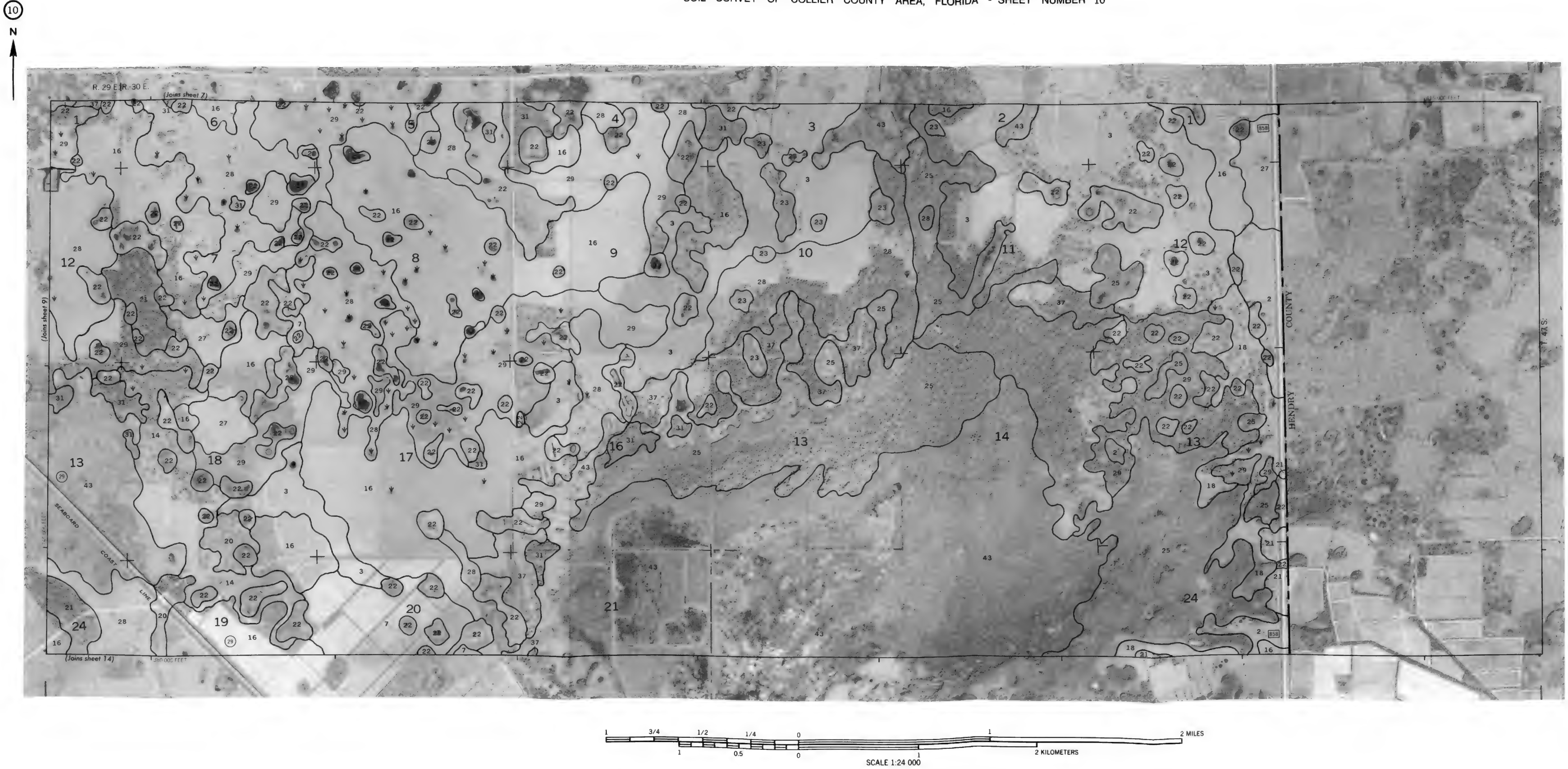

(Joins sheet 5)
(Joins sheet 12)
(Joins sheet 11)
(Joins sheet 9)
R. 27 E. | R. 28 E.
Ruess Island
Little Corkscrew Island
Eagle Island
CORKSCREW SWAMP
Hogan Island
BIG HAMMOCK
Horseshoe Marsh
BIG CORKSCREW ISLAND
Piggie Strand
849
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 9

9

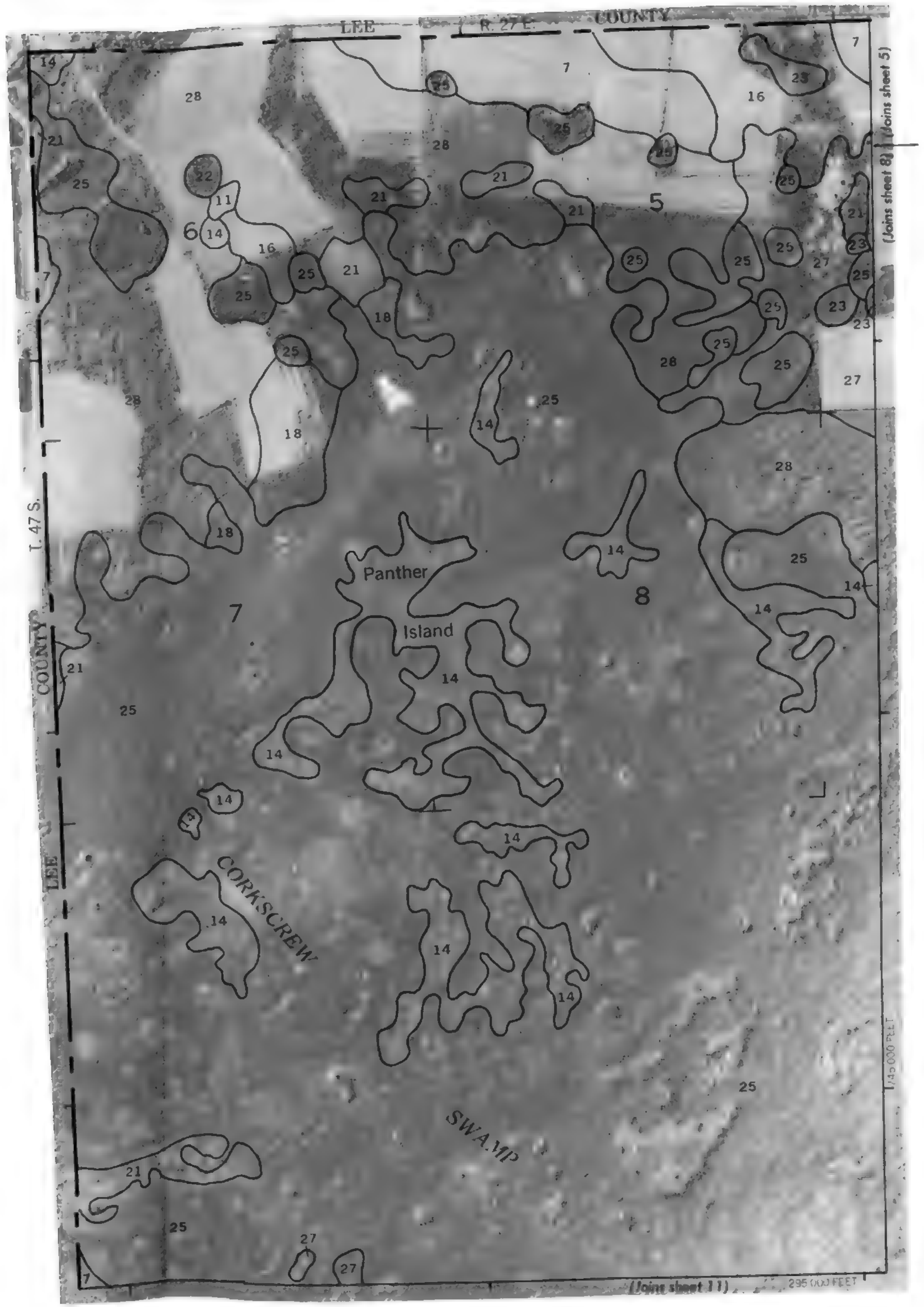
N

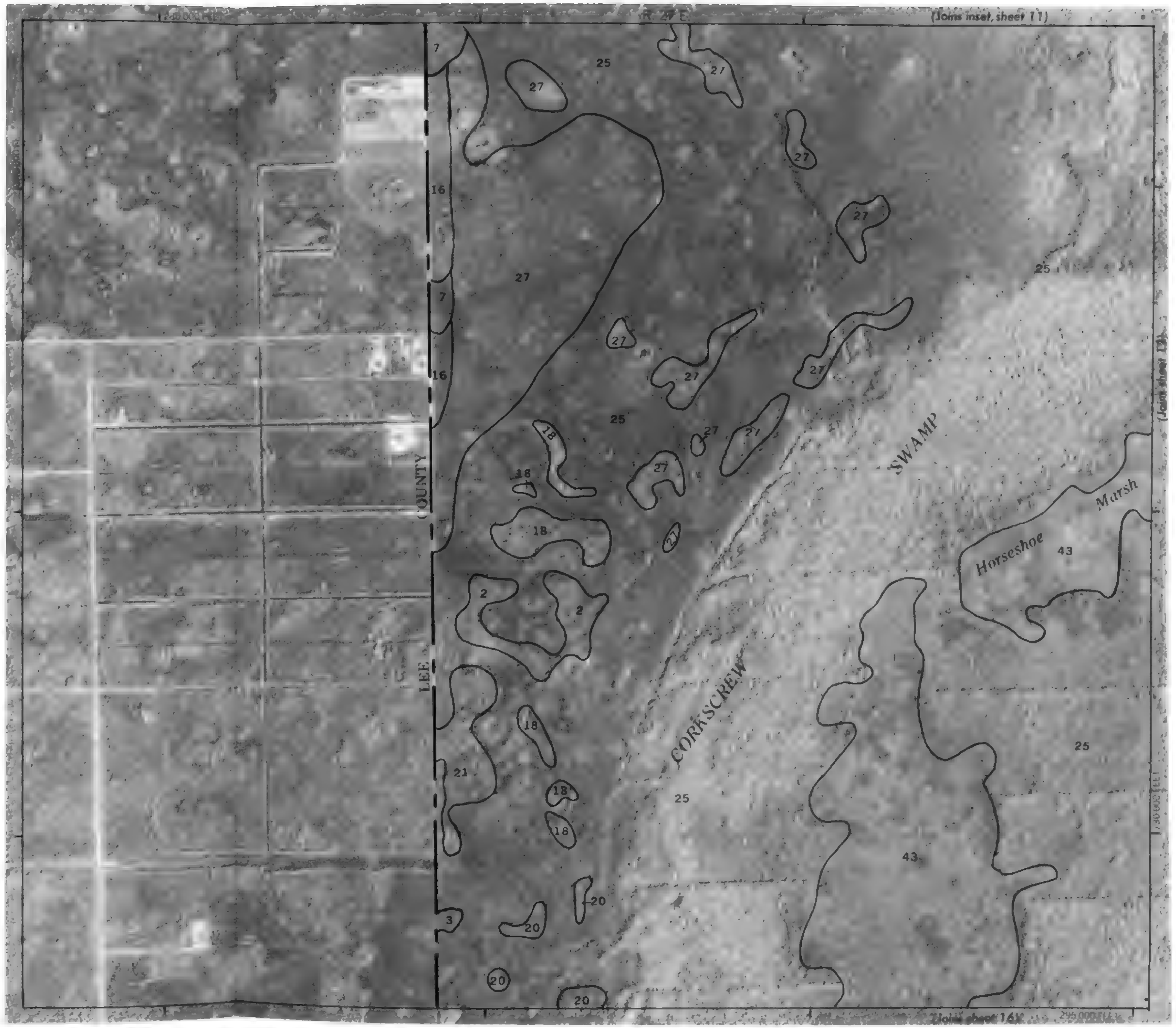



10
N
R. 29 E. R. 30 E.
(Joins sheet 7)
(Joins sheet 9)
(Joins sheet 14)
SEABOARD COAST LINE
HENDRY COUNTY
858
29
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

11

N





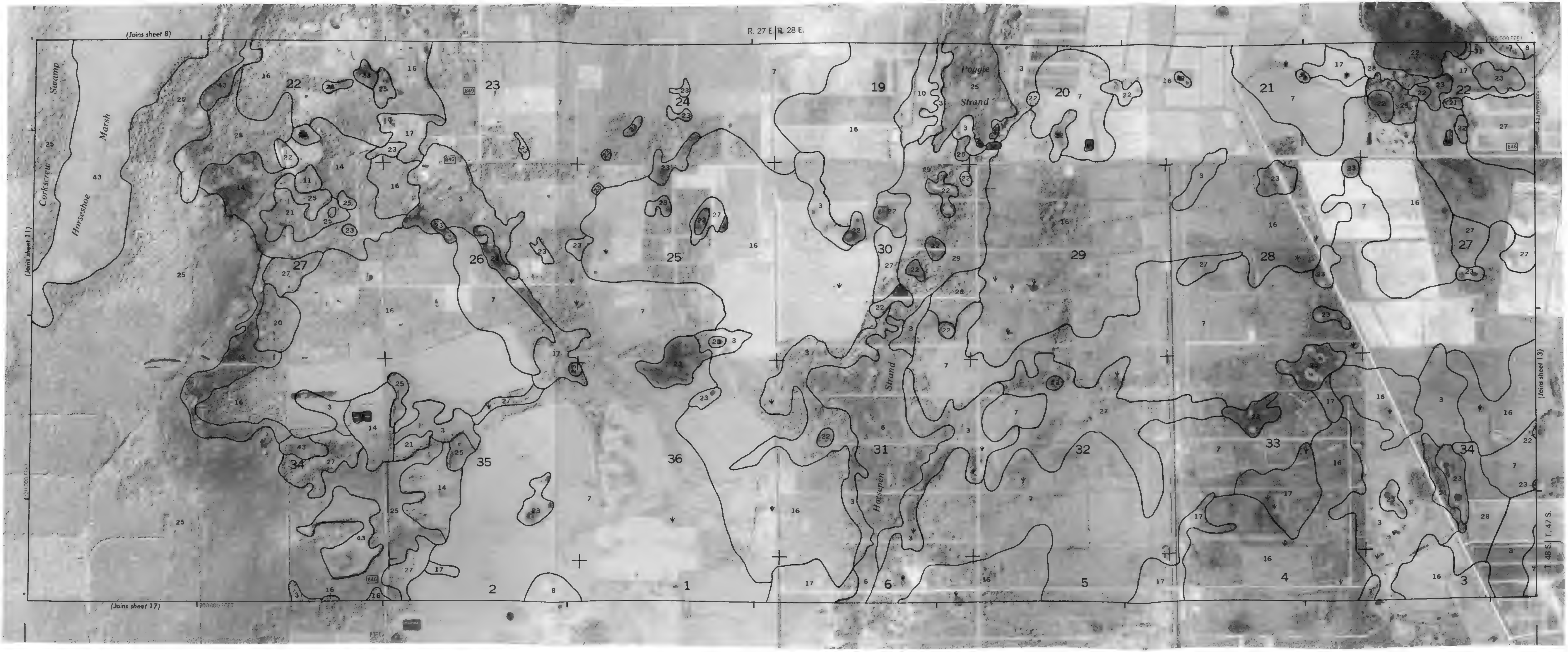
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 12

N

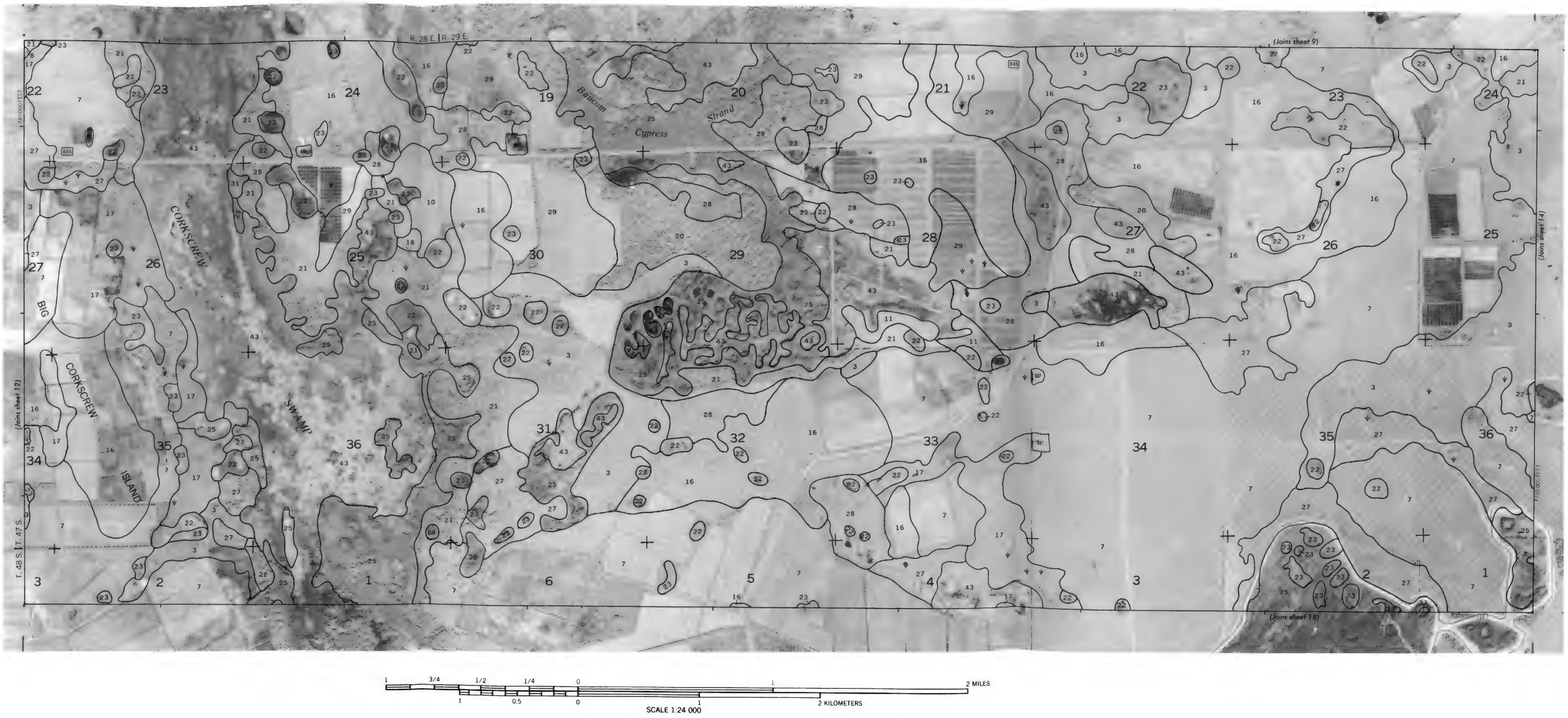


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 13



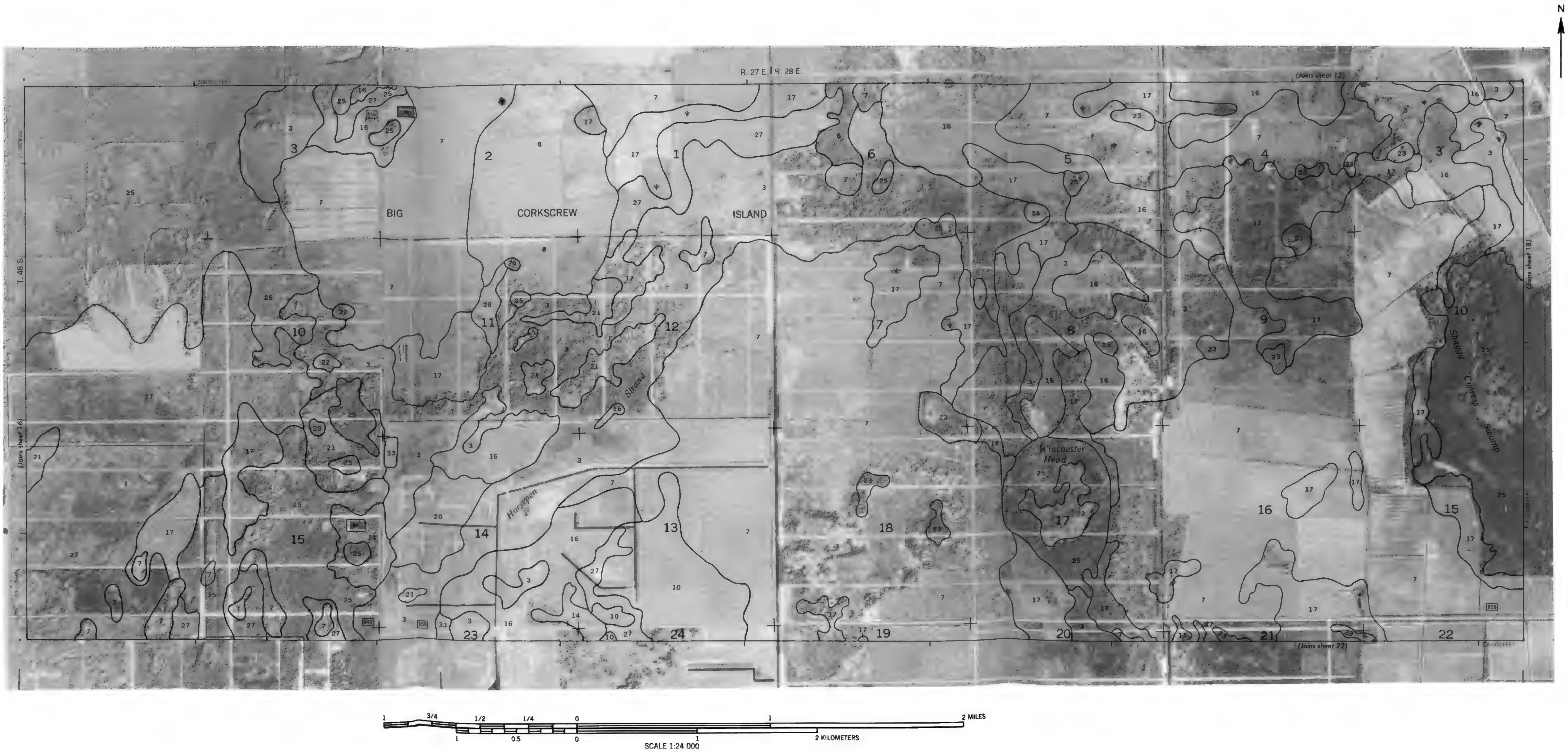
SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 14

SCALE 1:24 000


15
N
GULF
OF
MEXICO
Little
Hickory
Bay
Bonita Shores
LEE
COUNTY
R. 25 E. | R. 26 E.
T. 48 S.
(Joins sheet 16)
(Joins sheet 20)
water
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

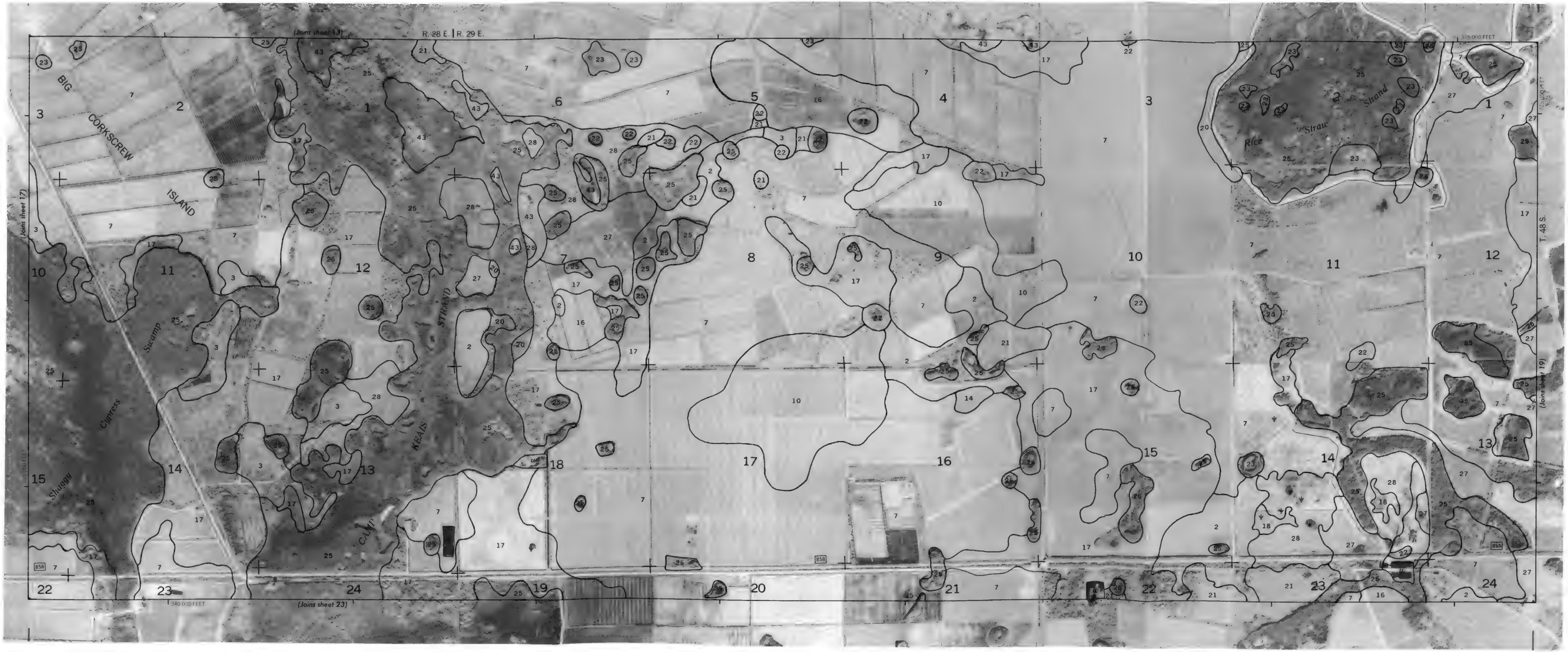
SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 16

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


N
R. 27 E. | R. 28 E.
(Joins sheet 12)
BIG
CORKSCREW
ISLAND
T. 48 S.
(Joins sheet 16)
(Joins sheet 18)
Strand
Horsepen
Winchester Head
Shaggy Cypress Swamp
(Joins sheet 22)
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 18



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

19

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 20

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

21

N

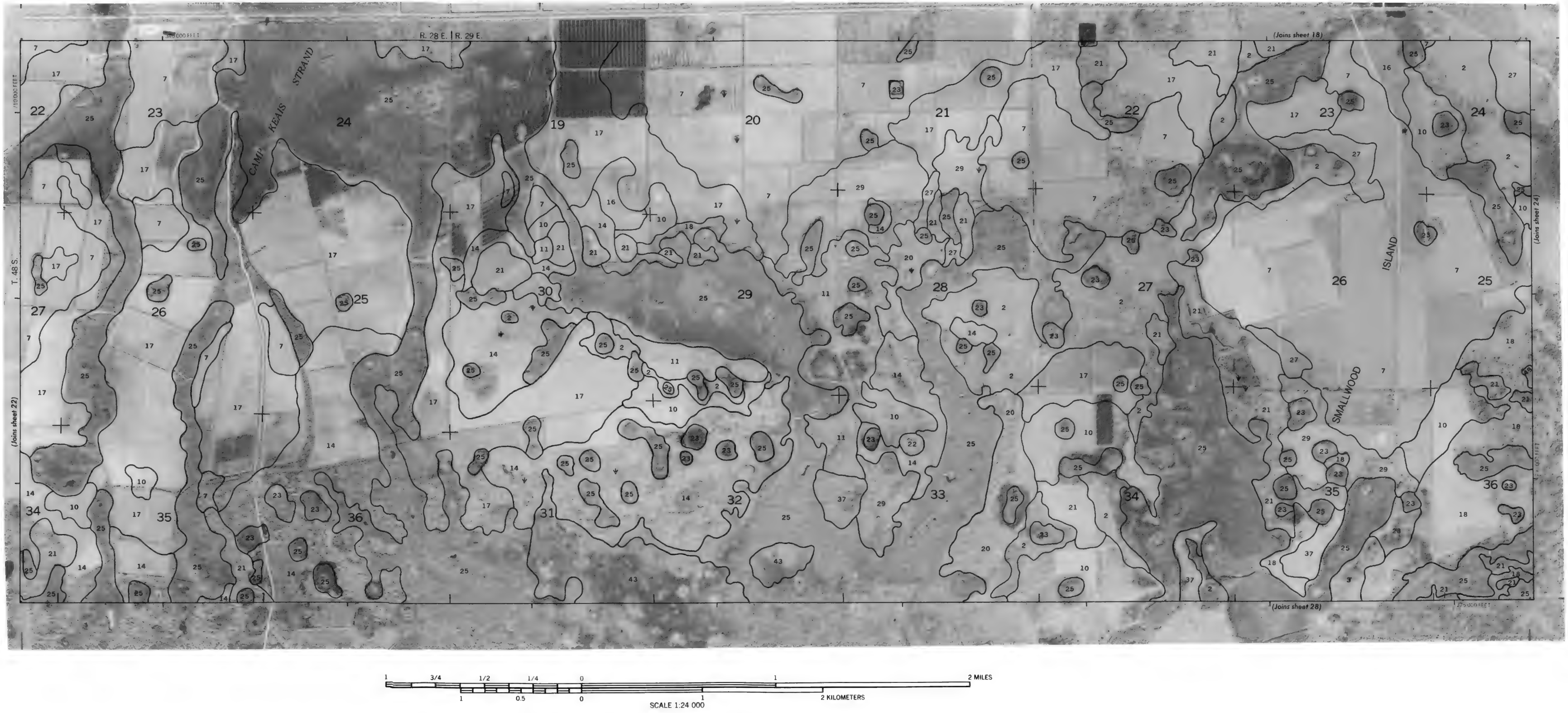
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 22

N


R. 28 E. | R. 29 E.
(Joins sheet 18)
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 28)
T. 48 S.
CAMP KEAIS STRAND
SMALLWOOD ISLAND
2 MILES
2 KILOMETERS
SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

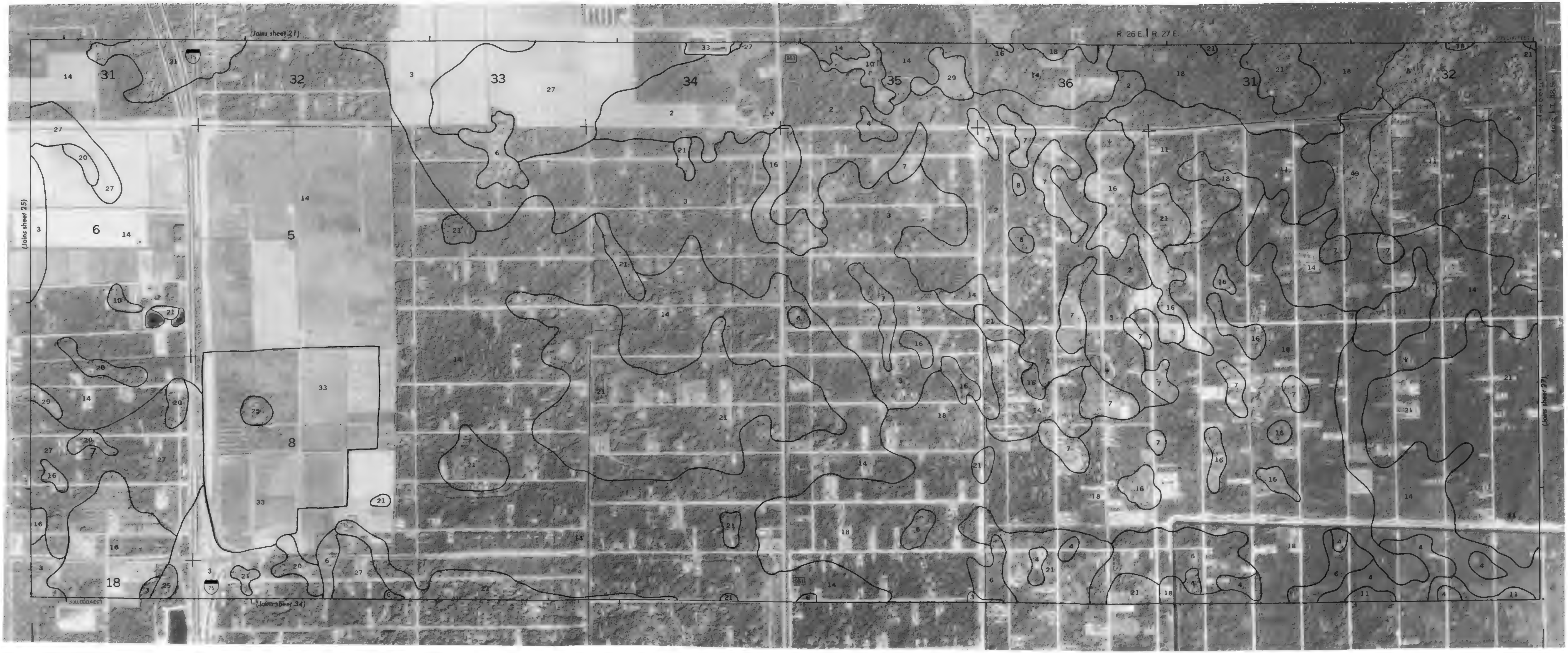
1 3/4 1/2 1/4 0 1 2 MILES

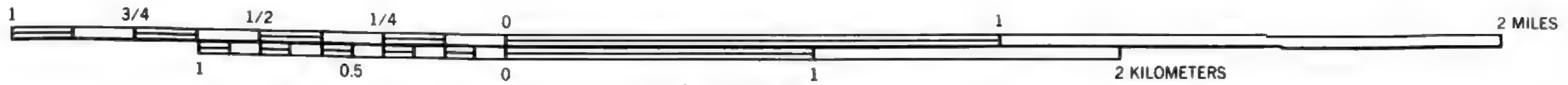
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

⑳26 N

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 26





27

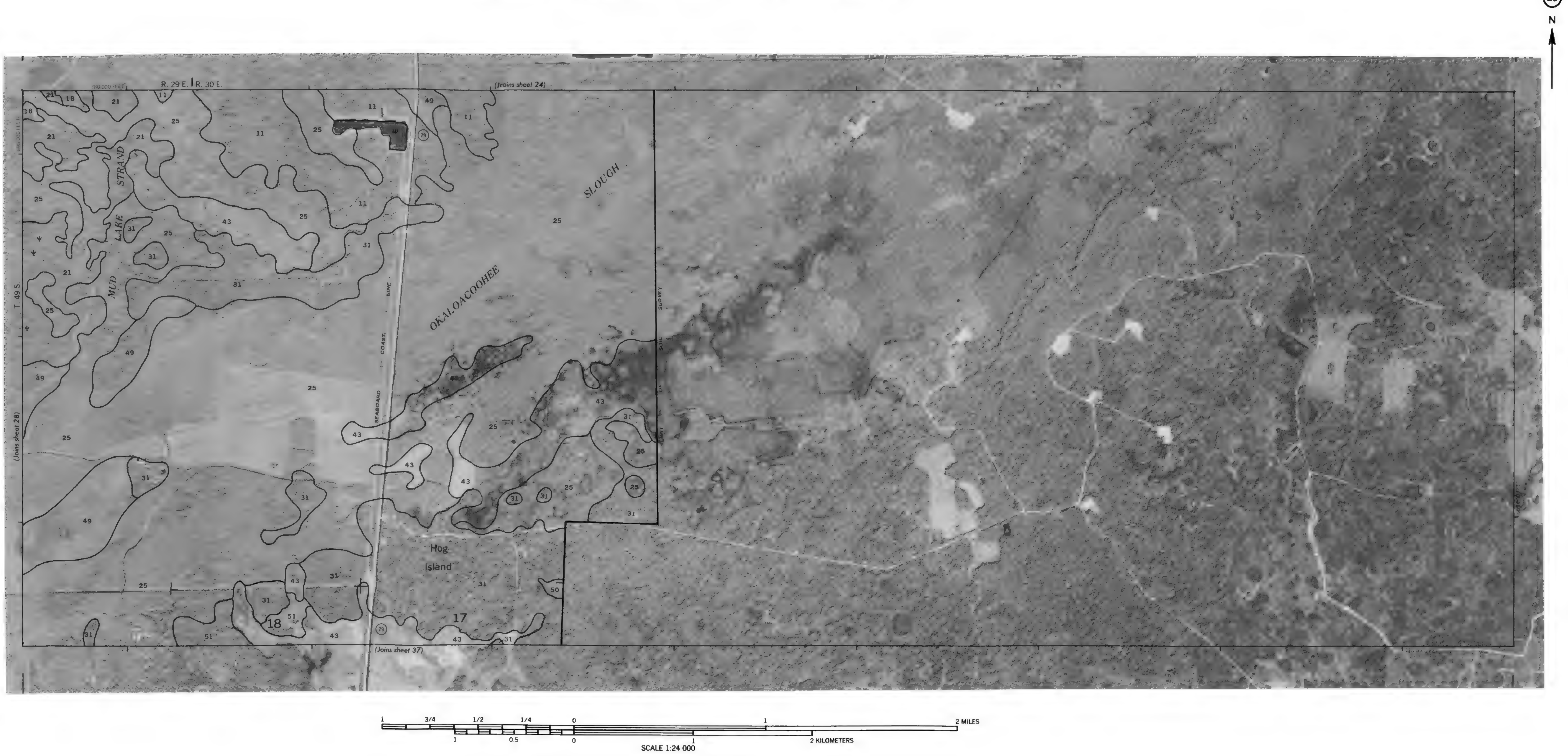
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

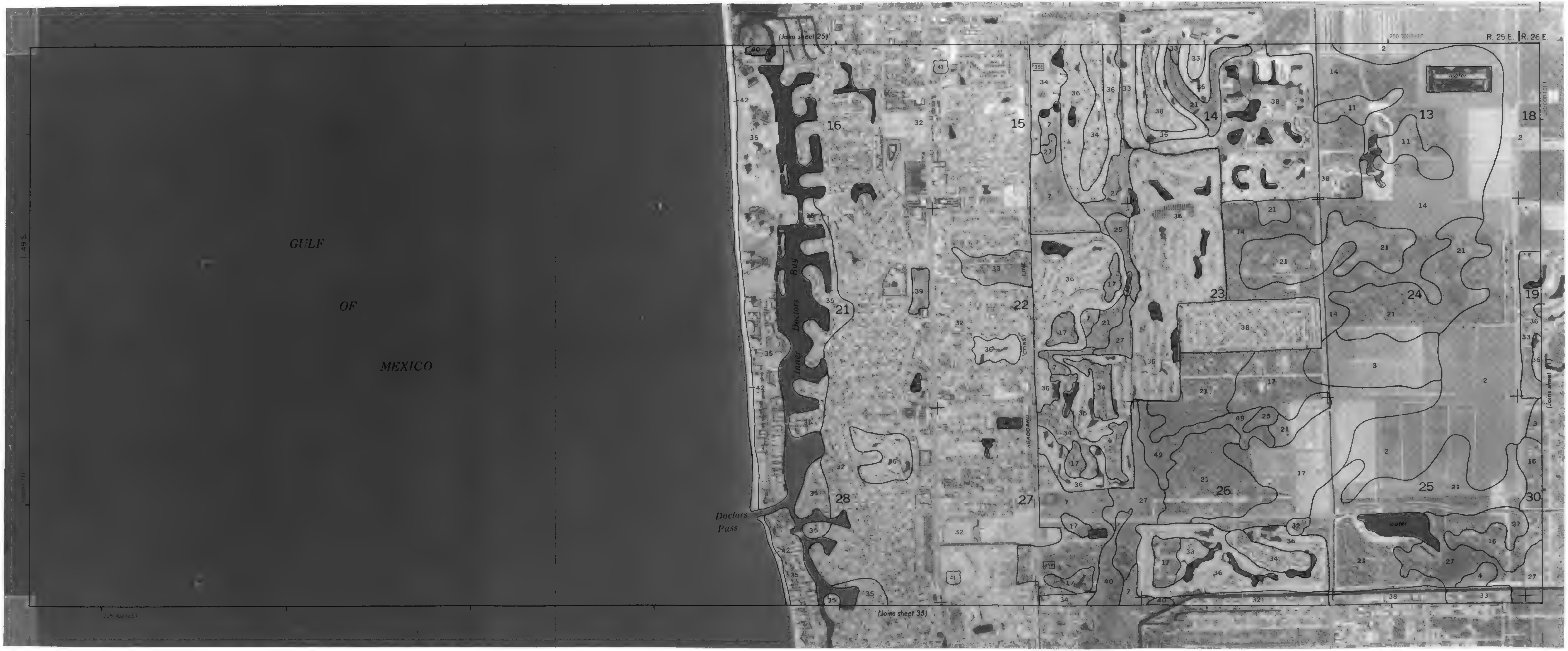
SCALE 1:24 000

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 28


29
N
R. 29 E. | R. 30 E.
(Joins sheet 24)
(Joins sheet 28)
(Joins sheet 37)
T. 49 S.
MUD LAKE STRAND
OKALOACOOHEE SLOUGH
SEABOARD COAST LINE
LIMIT OF SOIL SURVEY
Hog Island
21
18
11
25
49
43
31
50
51
17
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

30

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

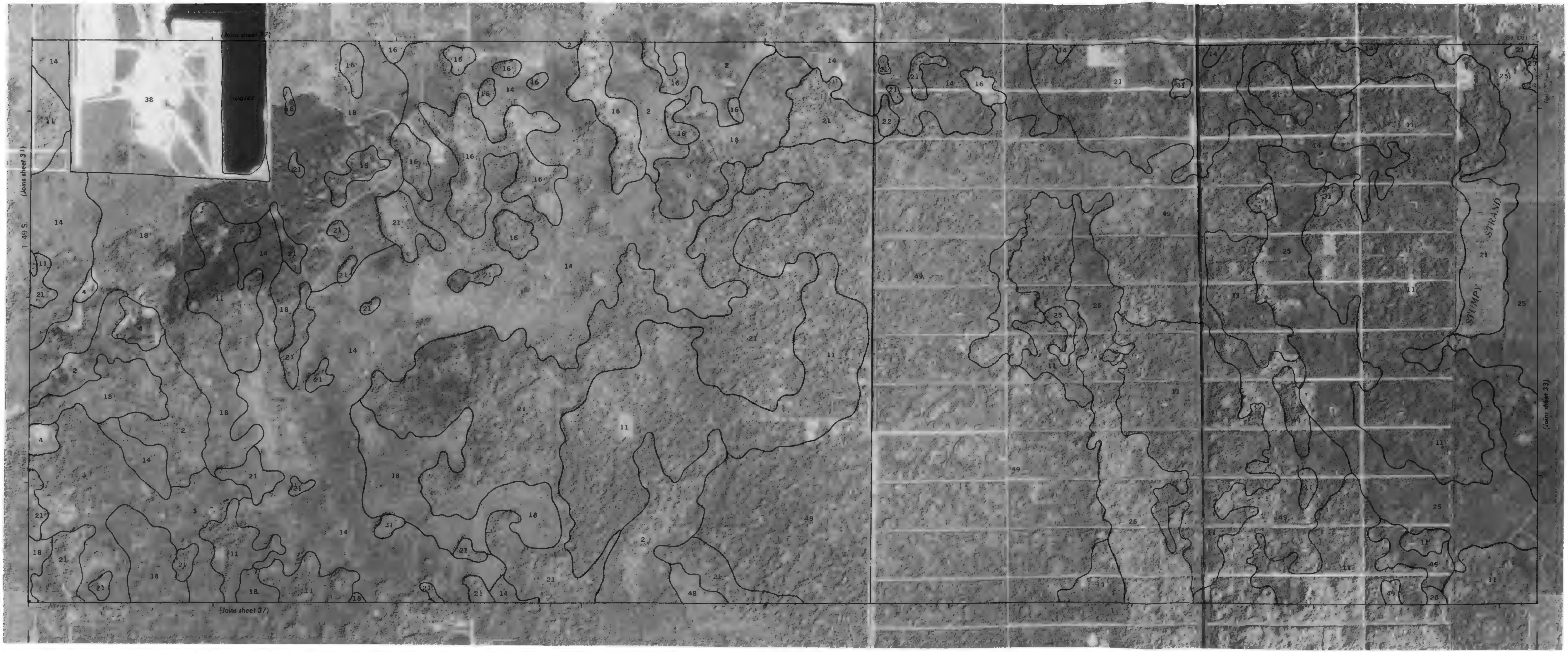
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 32

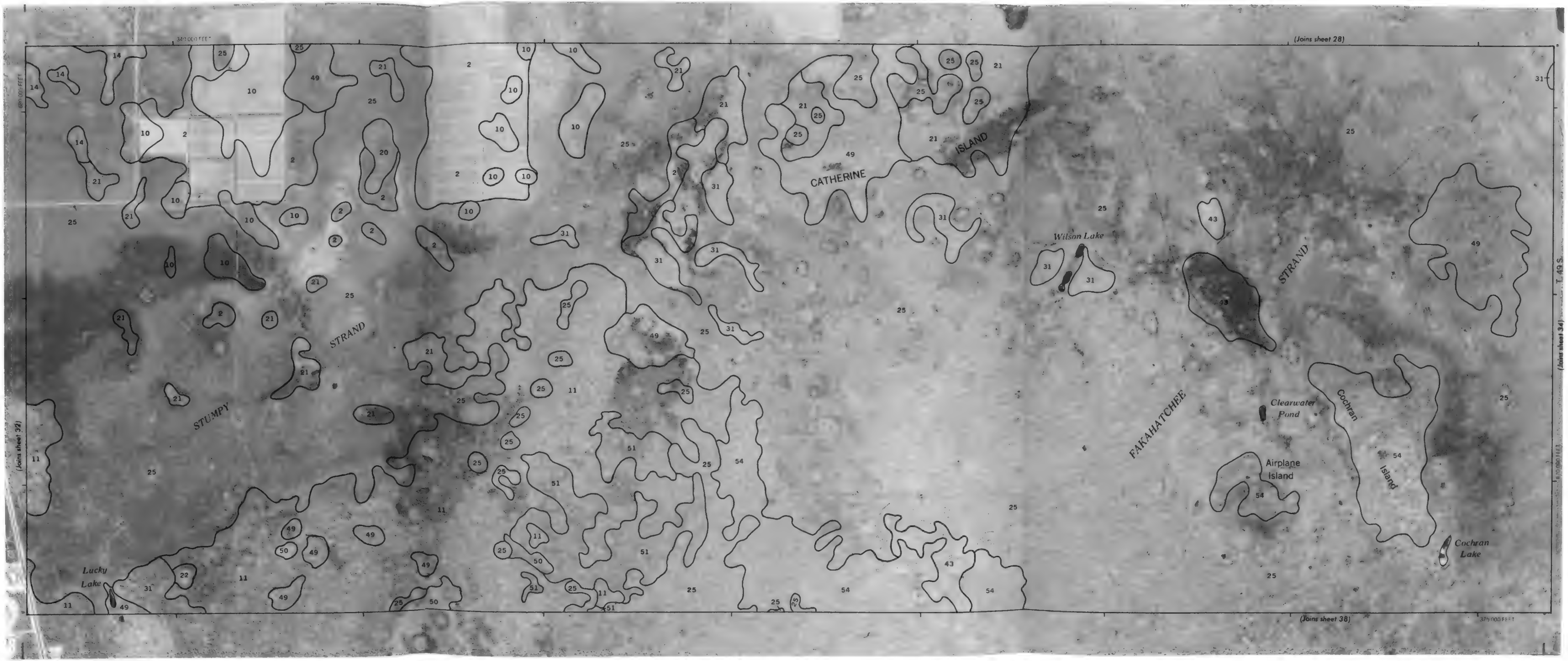


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

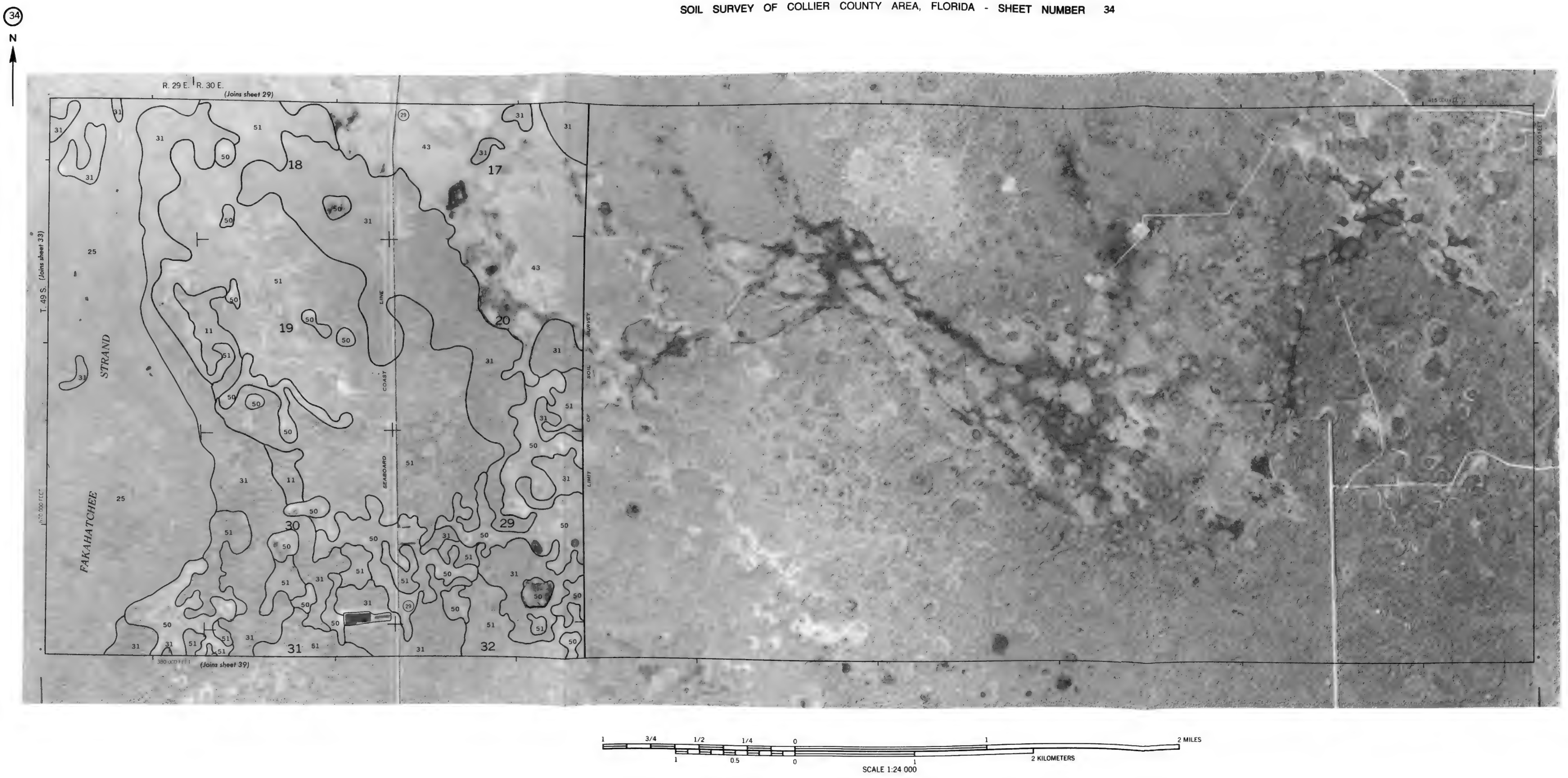
SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 33



33

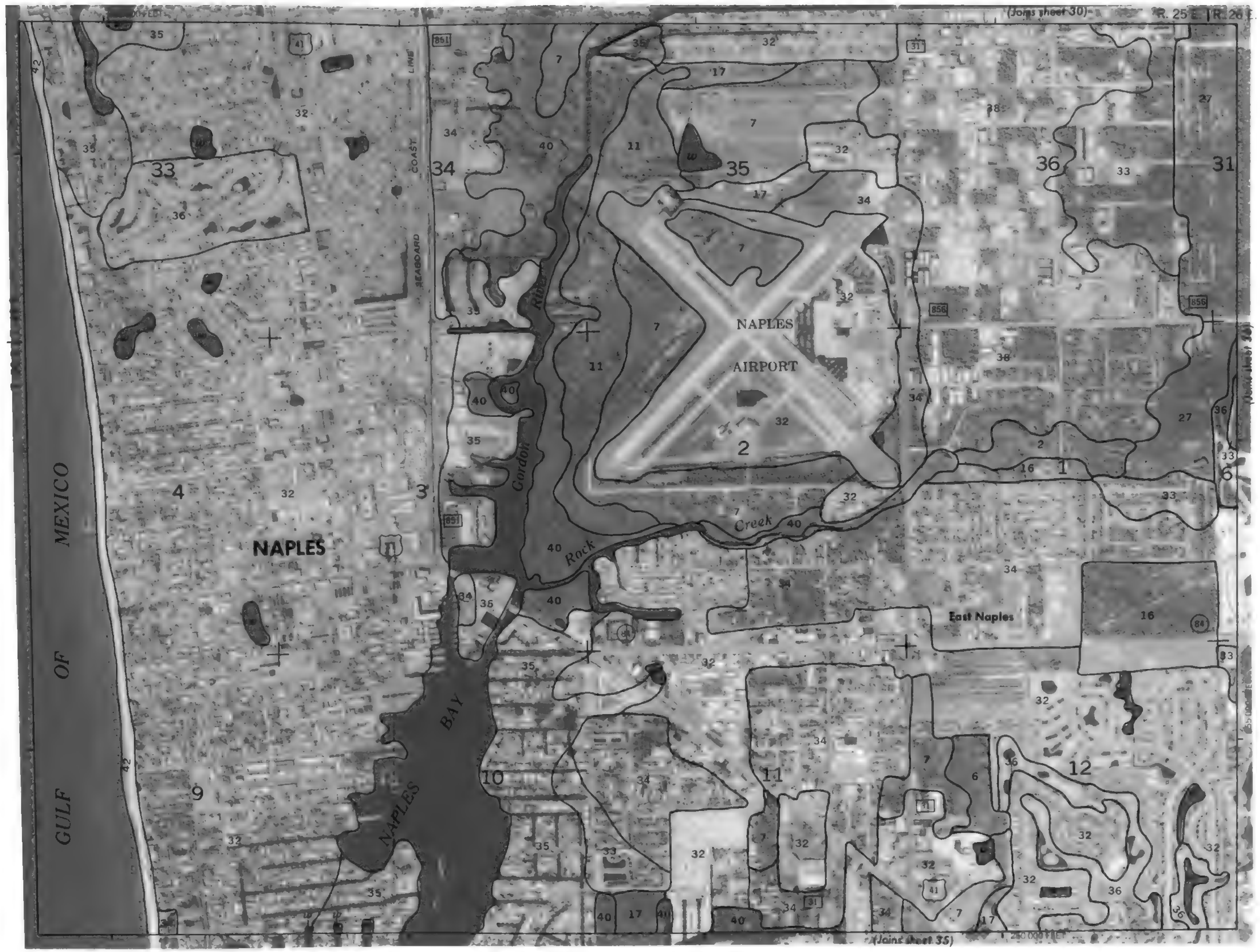
N

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


34
N
R. 29 E. R. 30 E.
(Joins sheet 29)
T. 49 S. (Joins sheet 33)
FAKAHATCHEE STRAND
SEABOARD COAST LINE
LIMIT OF SOIL SURVEY
(Joins sheet 39)
17
18
19
20
29
30
31
32
25
31
43
50
51
11
SCALE 1:24 000
2 MILES
2 KILOMETERS

(35)

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 36

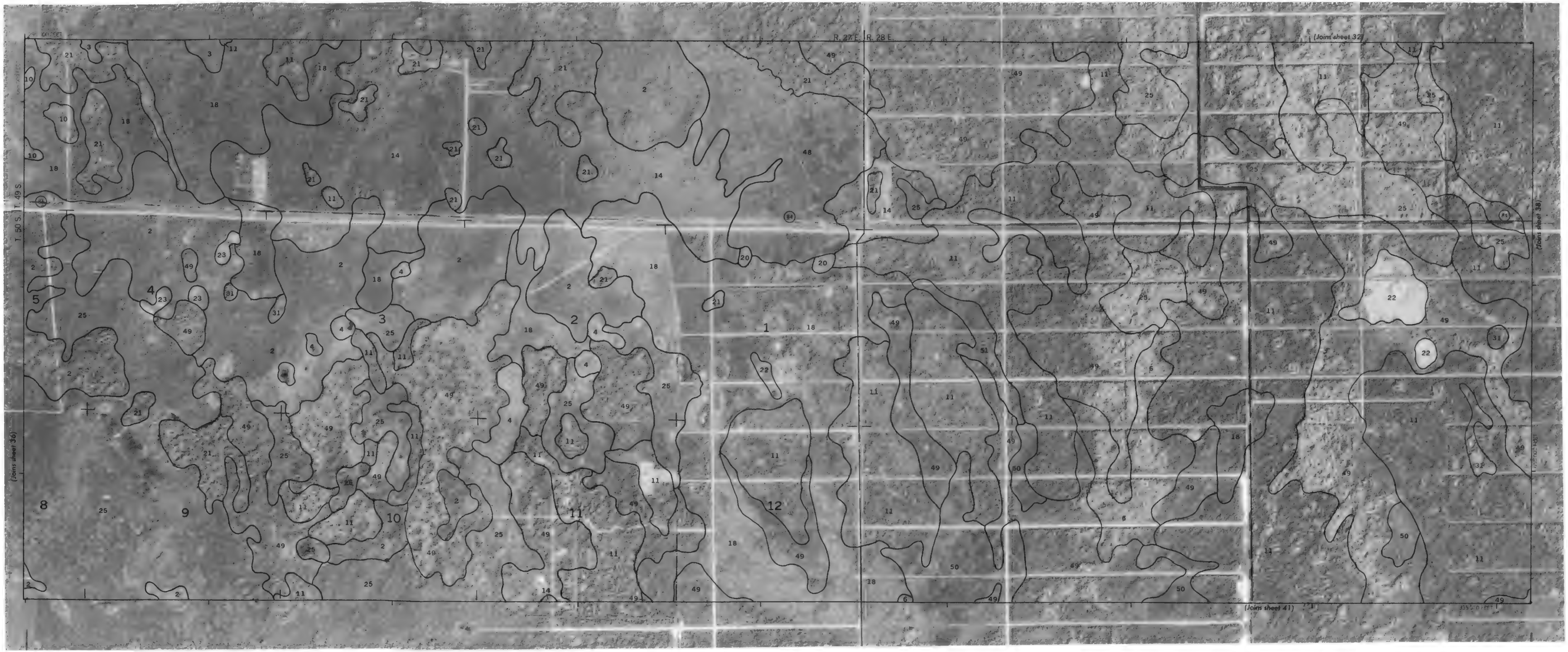
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

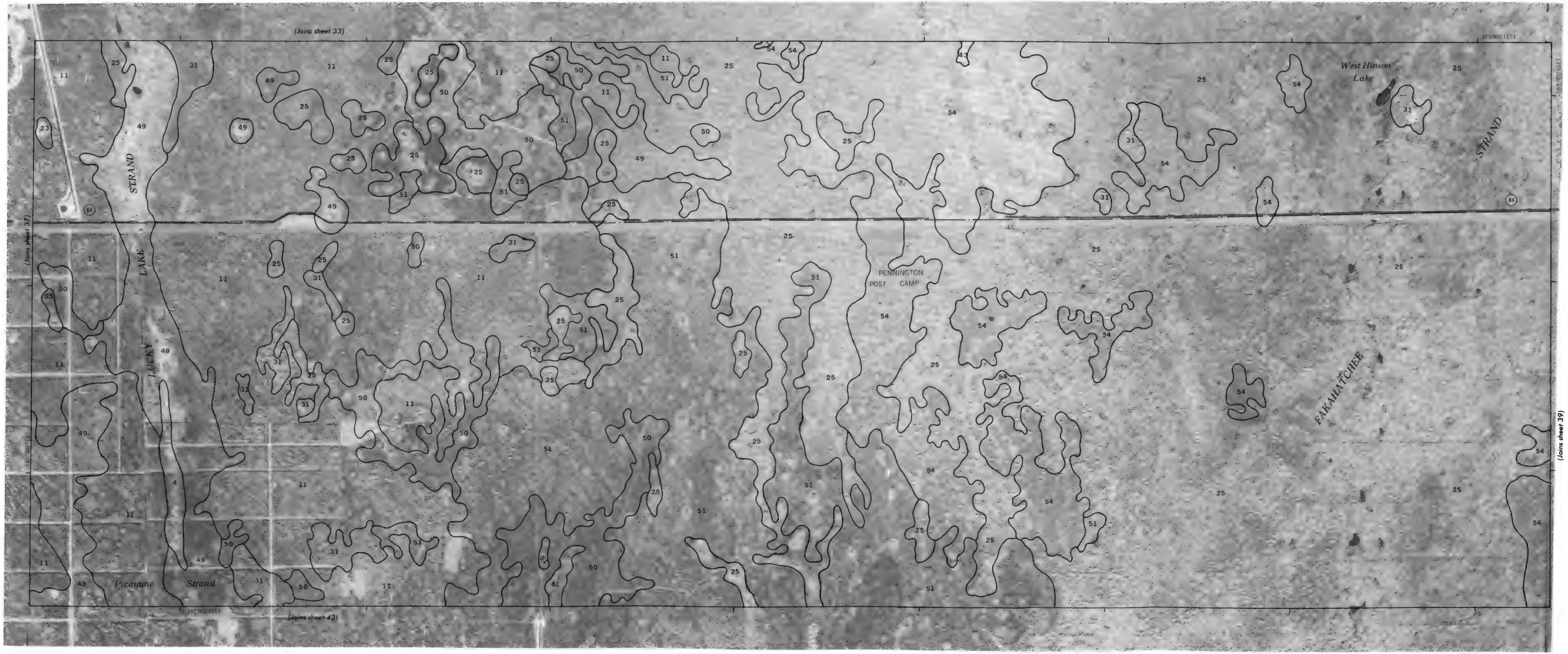


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

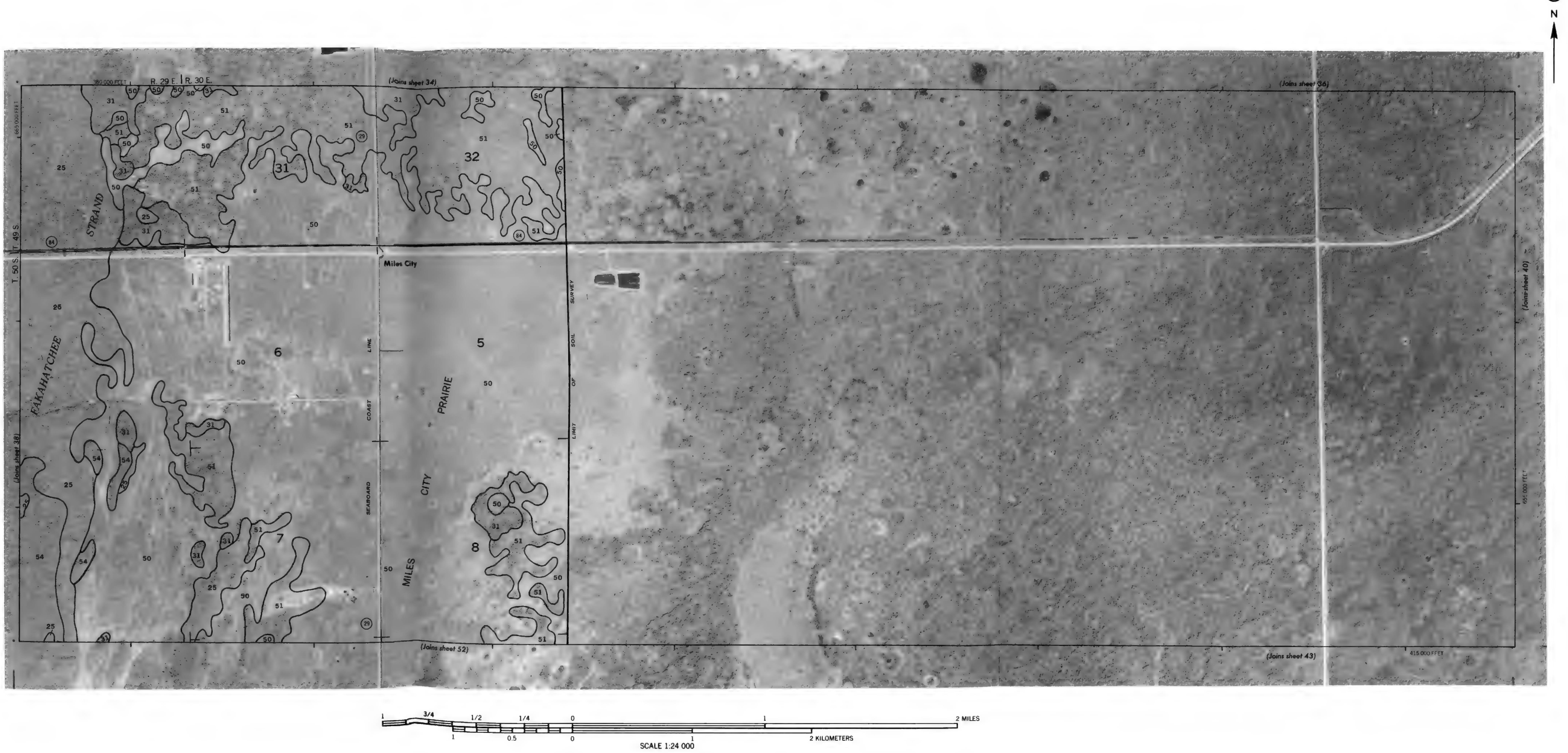
N



1 3/4 1/2 1/4 0 1 2 MILES

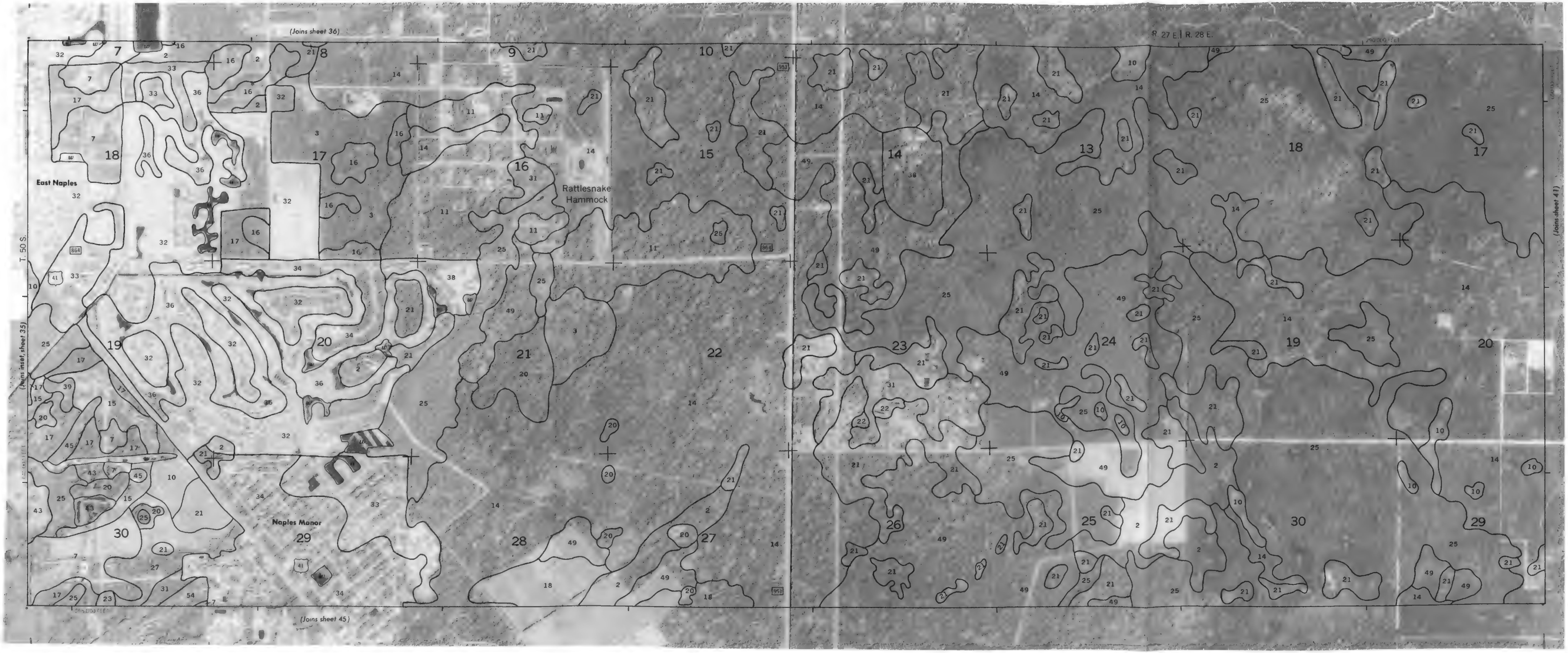
1 0.5 0 1 2 KILOMETERS

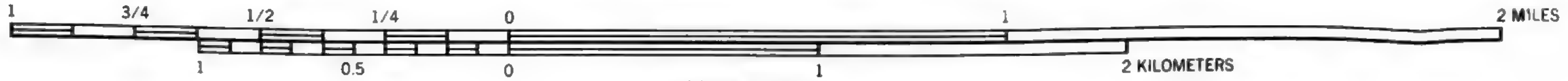
SCALE 1:24 000


39
N
(Joins sheet 34)
(Joins sheet 36)
(Joins sheet 38)
(Joins sheet 40)
(Joins sheet 52)
(Joins sheet 43)
R. 29 E.
R. 30 E.
T. 49 S.
T. 50 S.
Miles City
FAKAHATCHEE STRAND
MILES CITY PRAIRIE
SEABOARD COAST LINE
LIMIT OF SOIL SURVEY
SCALE 1:24 000
2 MILES
2 KILOMETERS

N

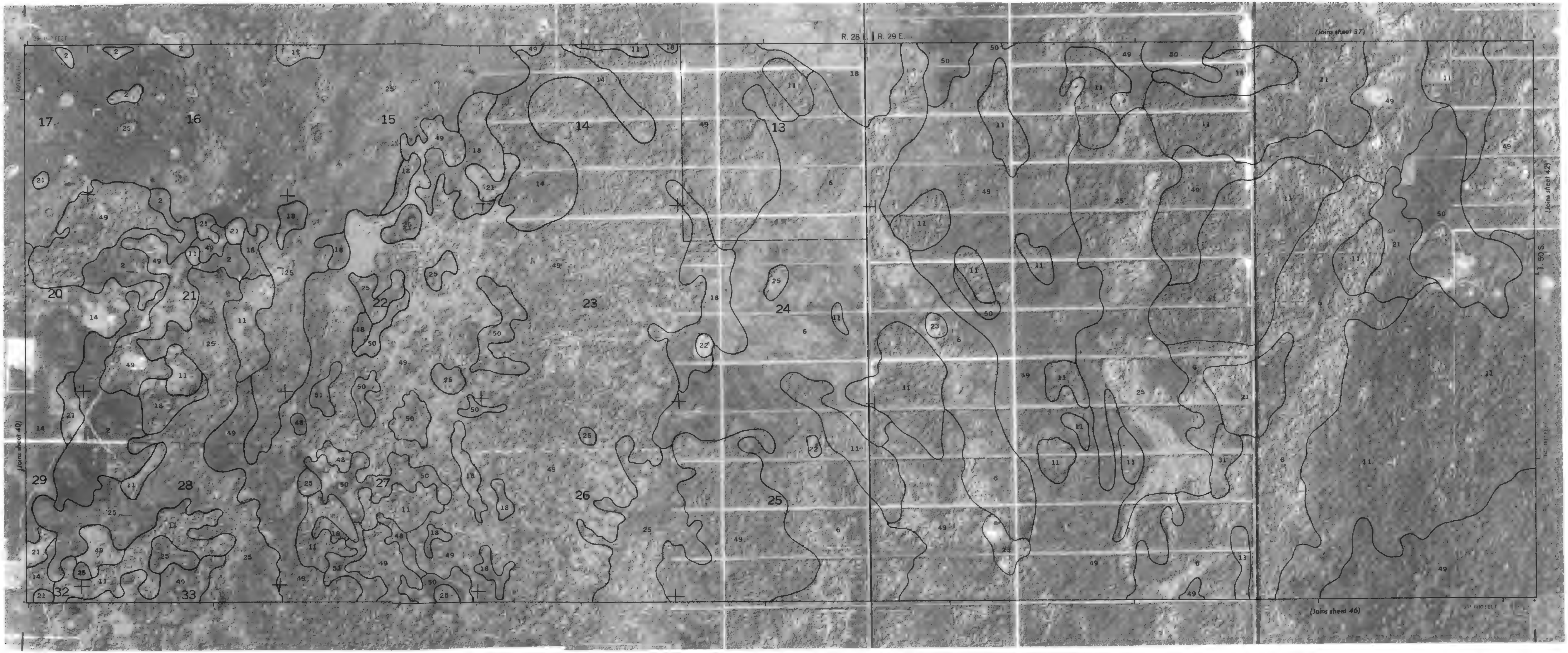
SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 40





SCALE 1:24 000

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

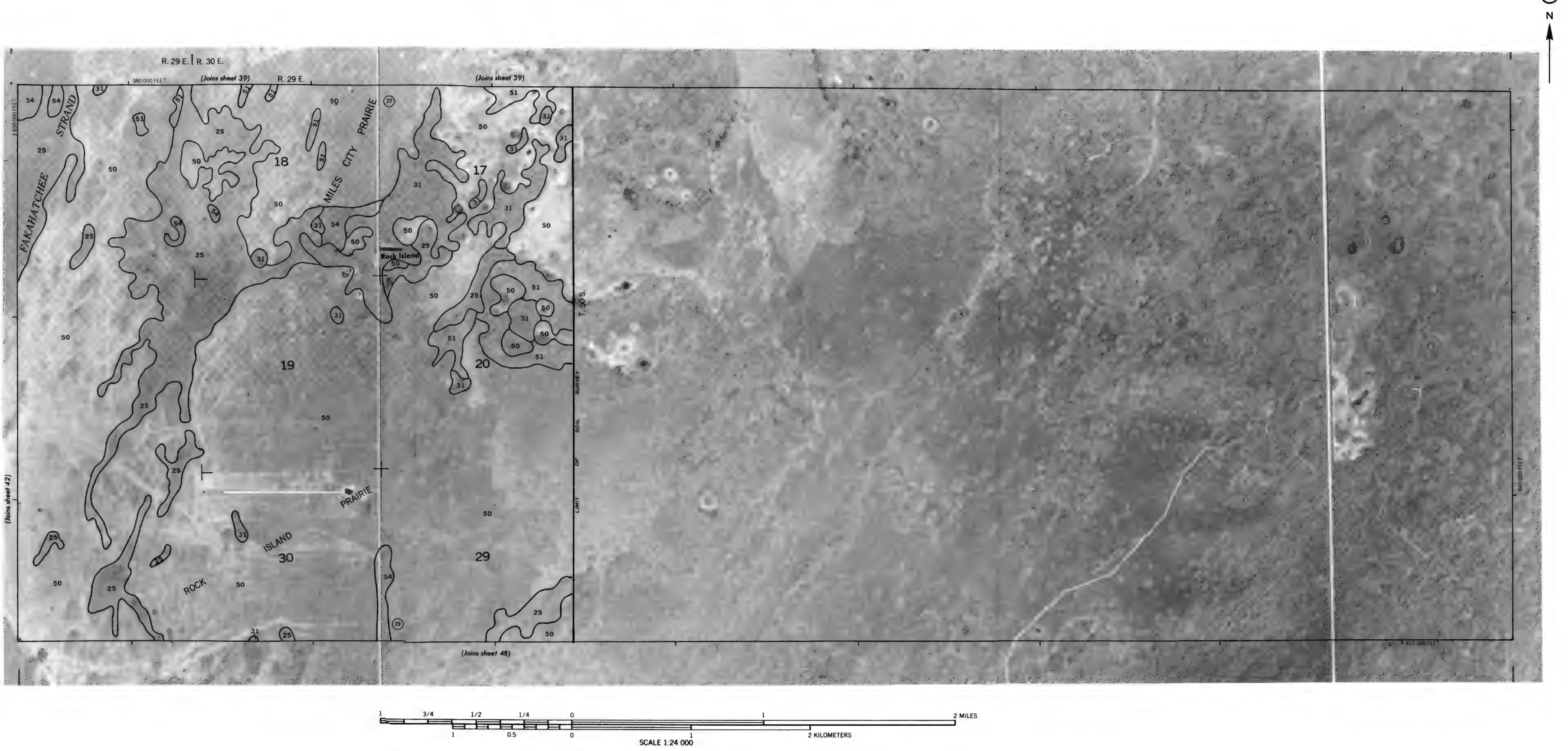
42

N

1 3/4 1/2 1/4 0 1 2 MILES

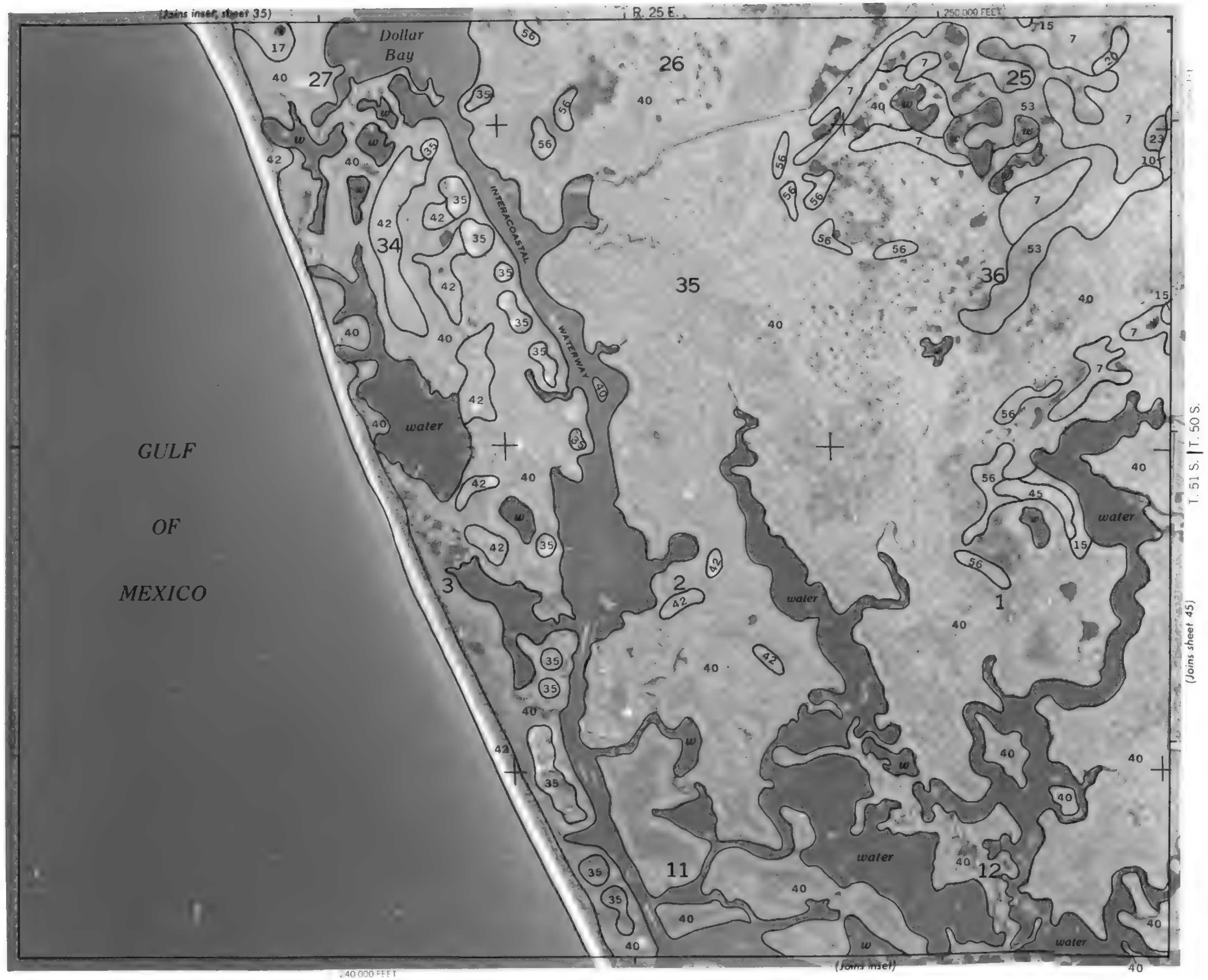
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


43
N
R. 29 E. R. 30 E.
380 000 FEET
(Joins sheet 39)
R. 29 E.
(Joins sheet 39)
FAKAHATCHEE STRAND
MILES CITY PRAIRIE
Rock Island
ROCK ISLAND PRAIRIE
18
17
19
20
30
29
T. 50 S.
LIMIT OF SOIL SURVEY
(Joins sheet 42)
(Joins sheet 48)
640 000 FEET
415 000 FEET
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

44

N



1 3/4 1/2 1/4 0 1 2 MILES

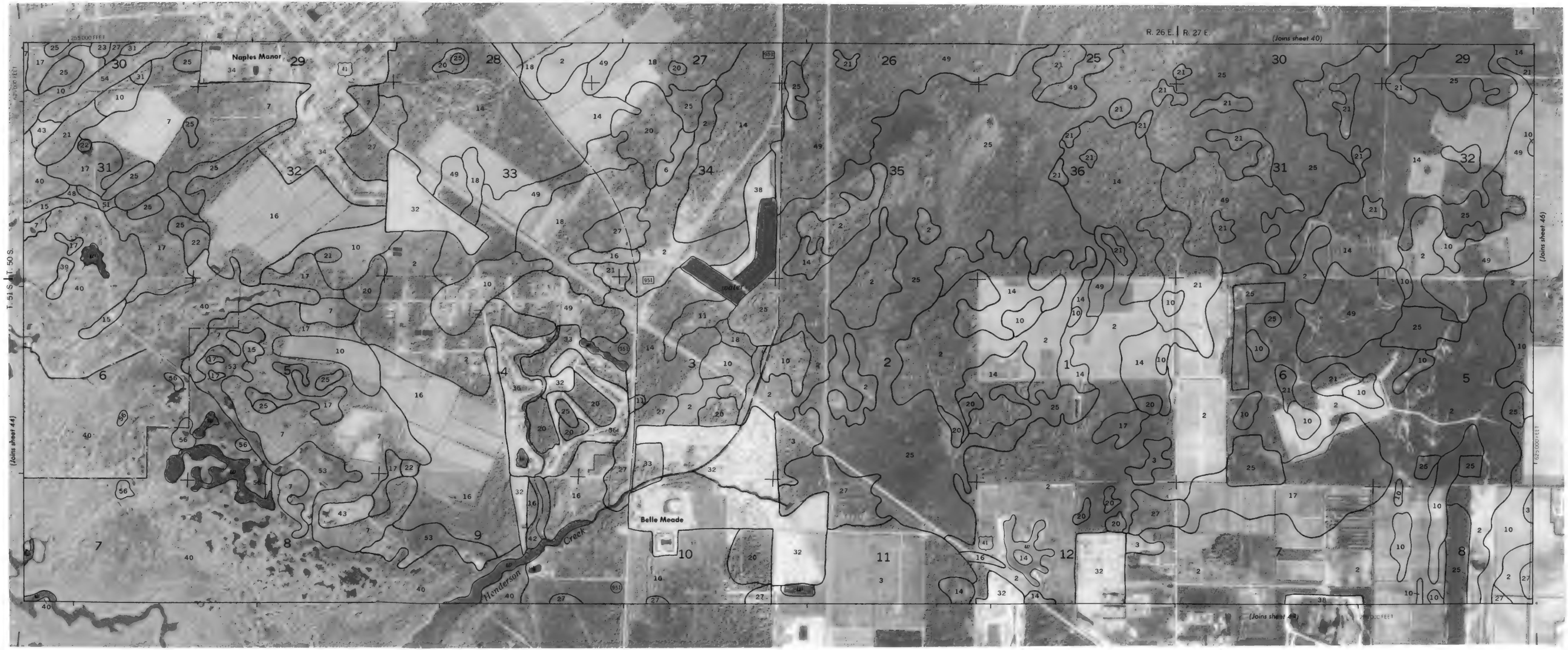
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 45

45

N



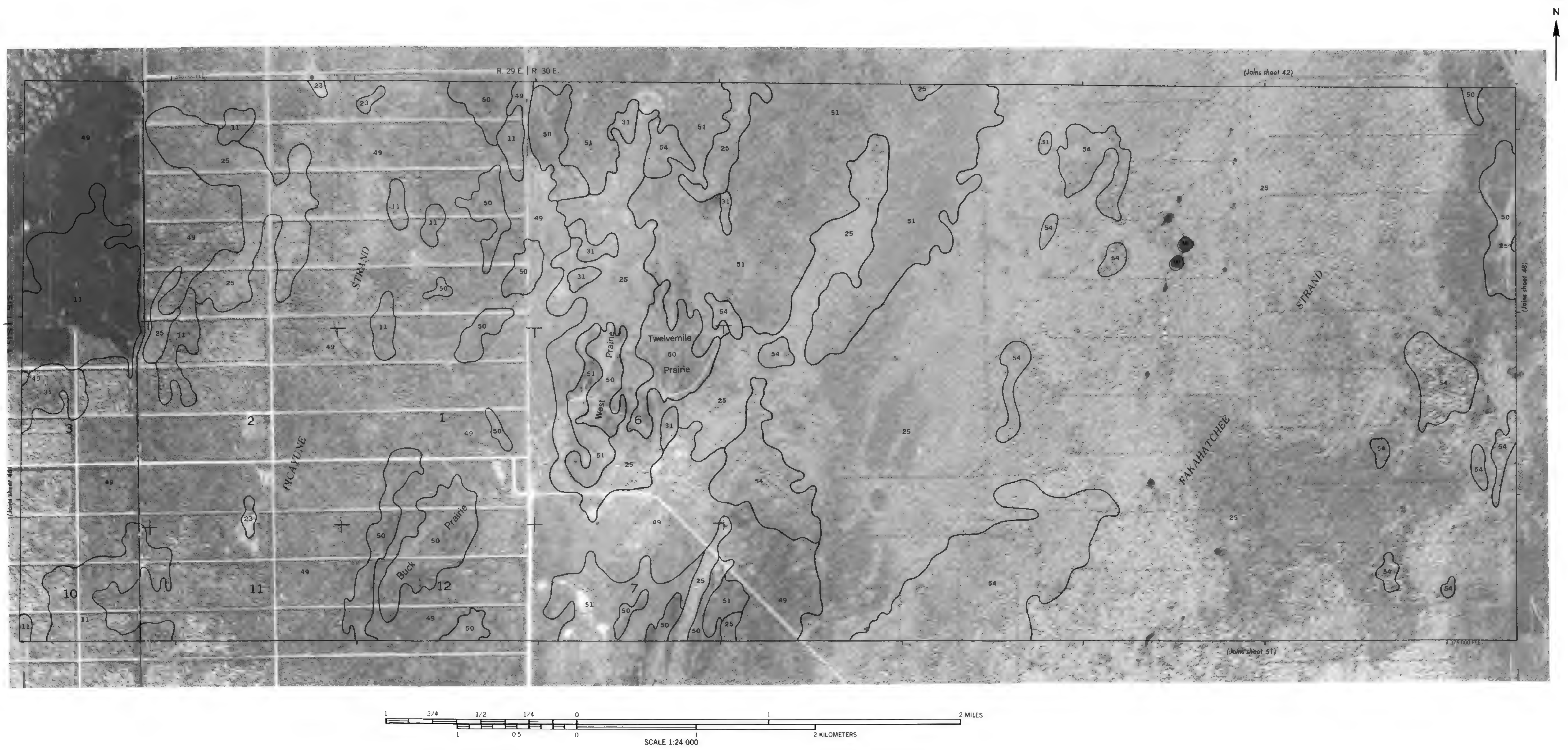
1 3/4 1/2 1/4 0 1 2 MILES

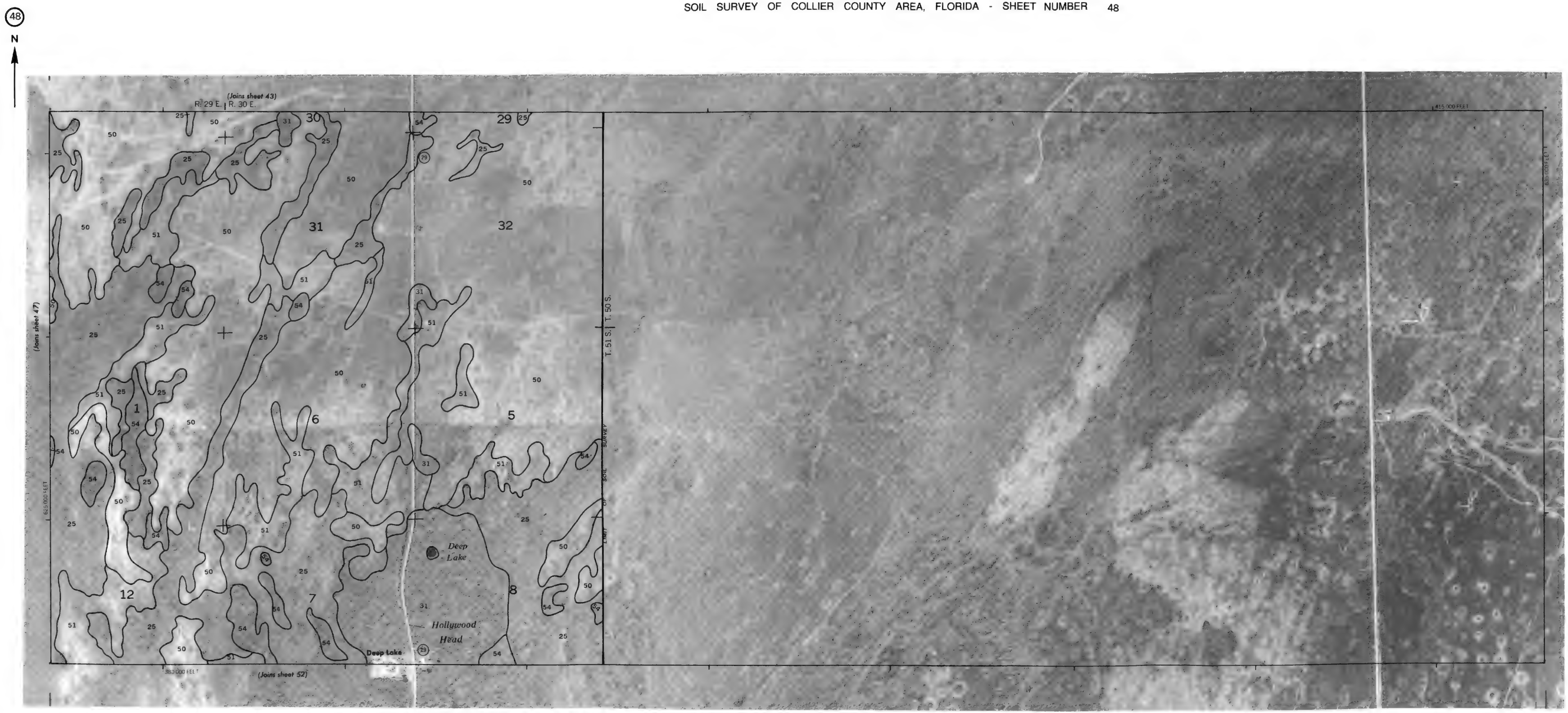
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

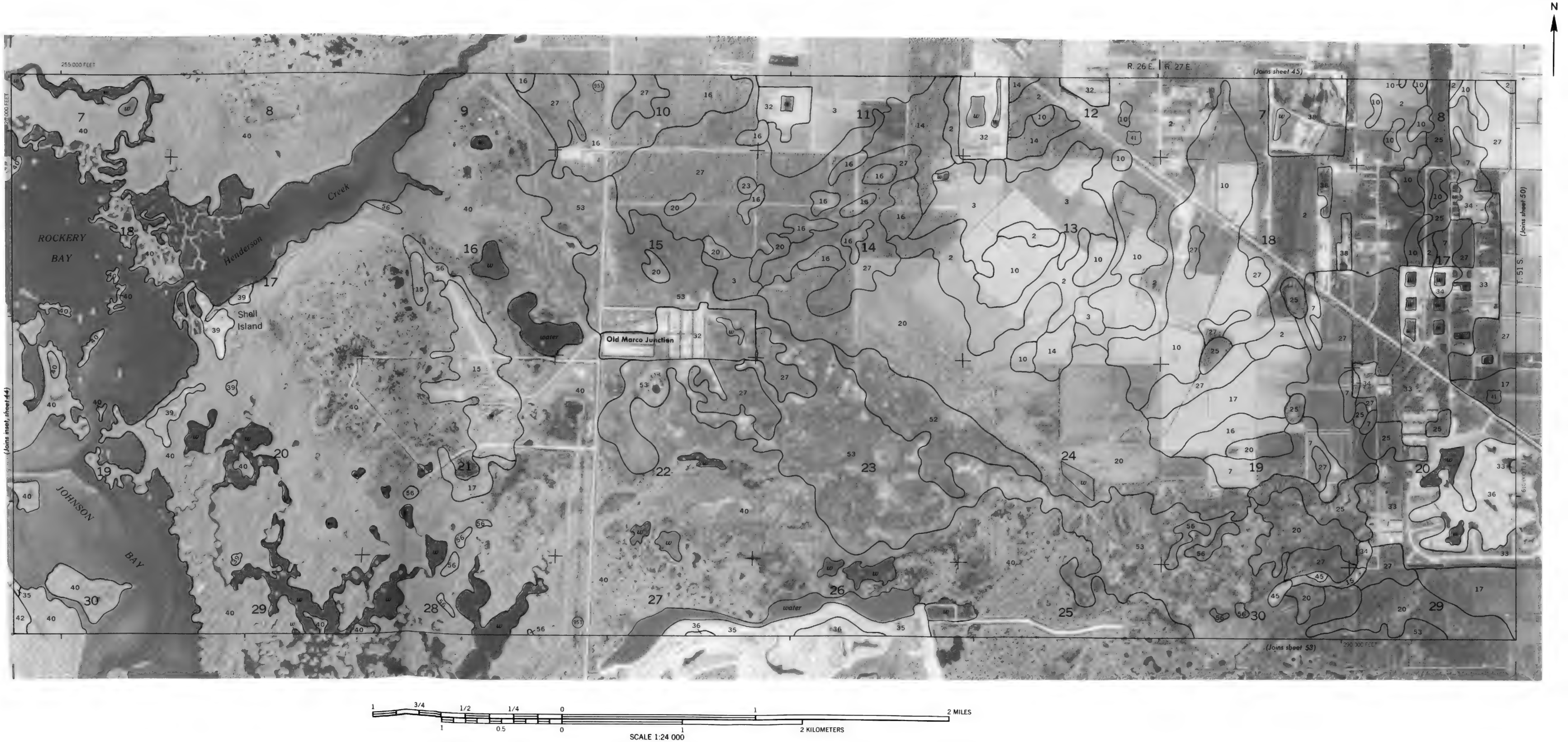
46


N
(Joins sheet 41)
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 50)
R. 28 E.
R. 29 E.
T. 51 S.
T. 50 S.
625 000 FEET
295 000 FEET
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000


47
N
R. 29 E. | R. 30 E.
(Joins sheet 42)
(Joins sheet 48)
(Joins sheet 51)
(Joins sheet 46)
STRAND
PICAYUNE
Twelvemile
Prairie
West
Prairie
Buck
Prairie
FAKAHATCHEE
STRAND
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

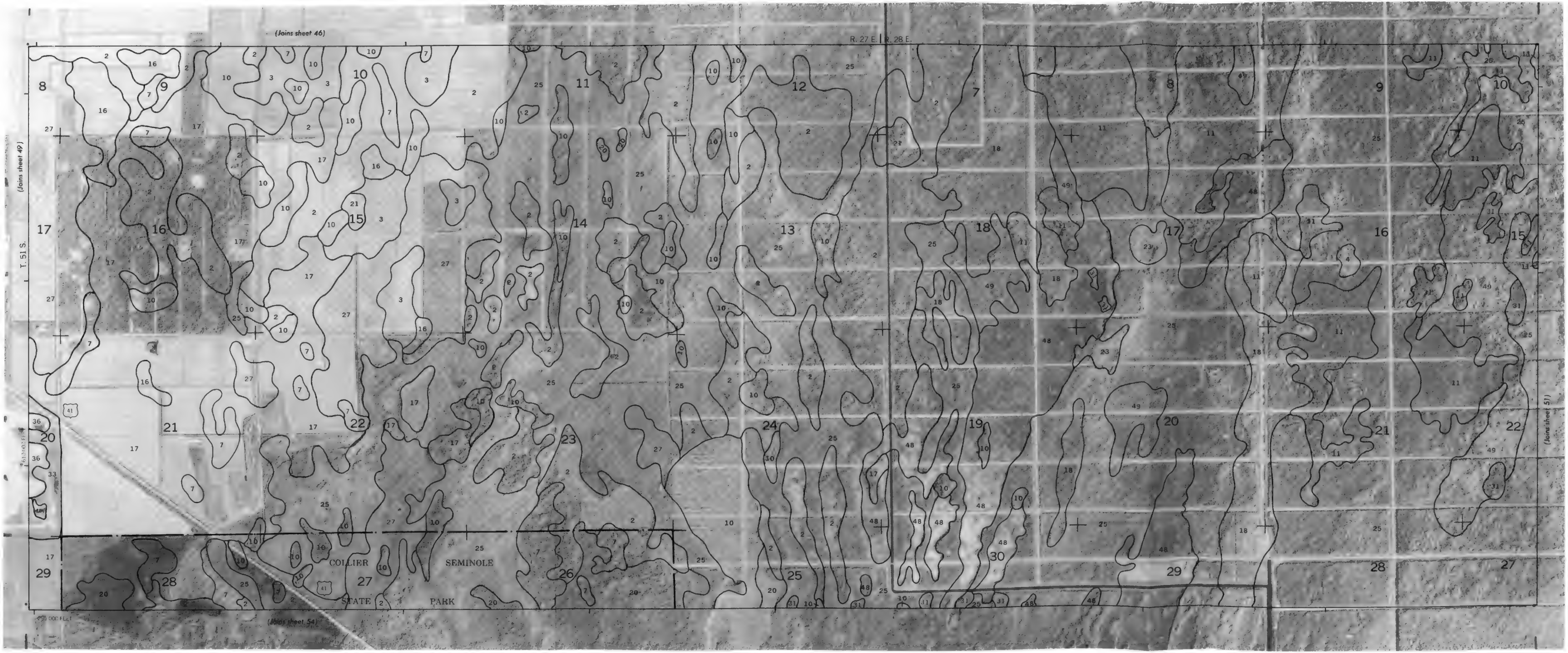


1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


N
ROCKERY BAY
JOHNSON BAY
Henderson Creek
Shell Island
Old Marco Junction
water
R. 26 E. | R. 27 E.
(Joins sheet 45)
(Joins sheet 50)
(Joins sheet 53)
(Joins inset, sheet 44)
T. 51 S.
255 000 FEET
290 000 FEET
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

50

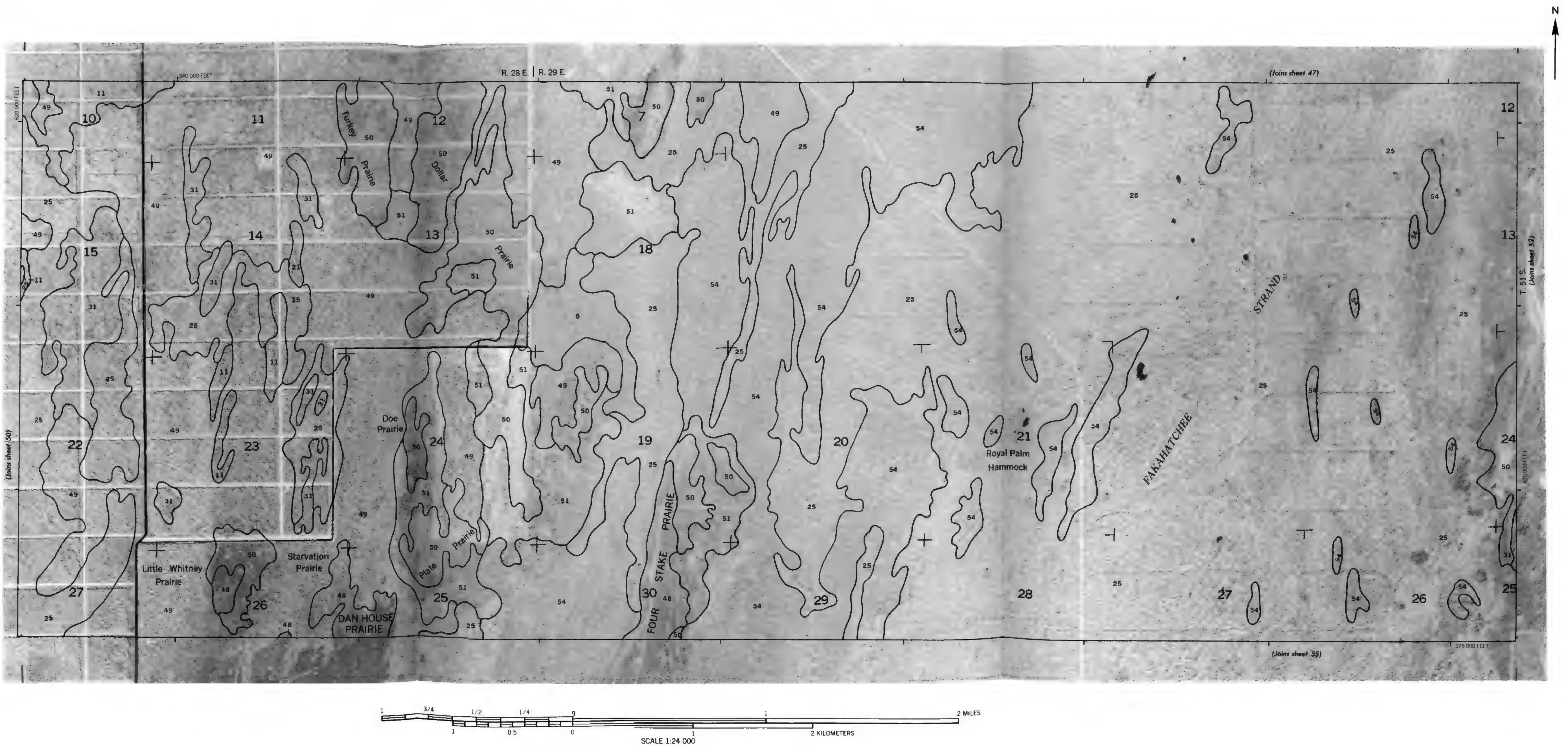
N

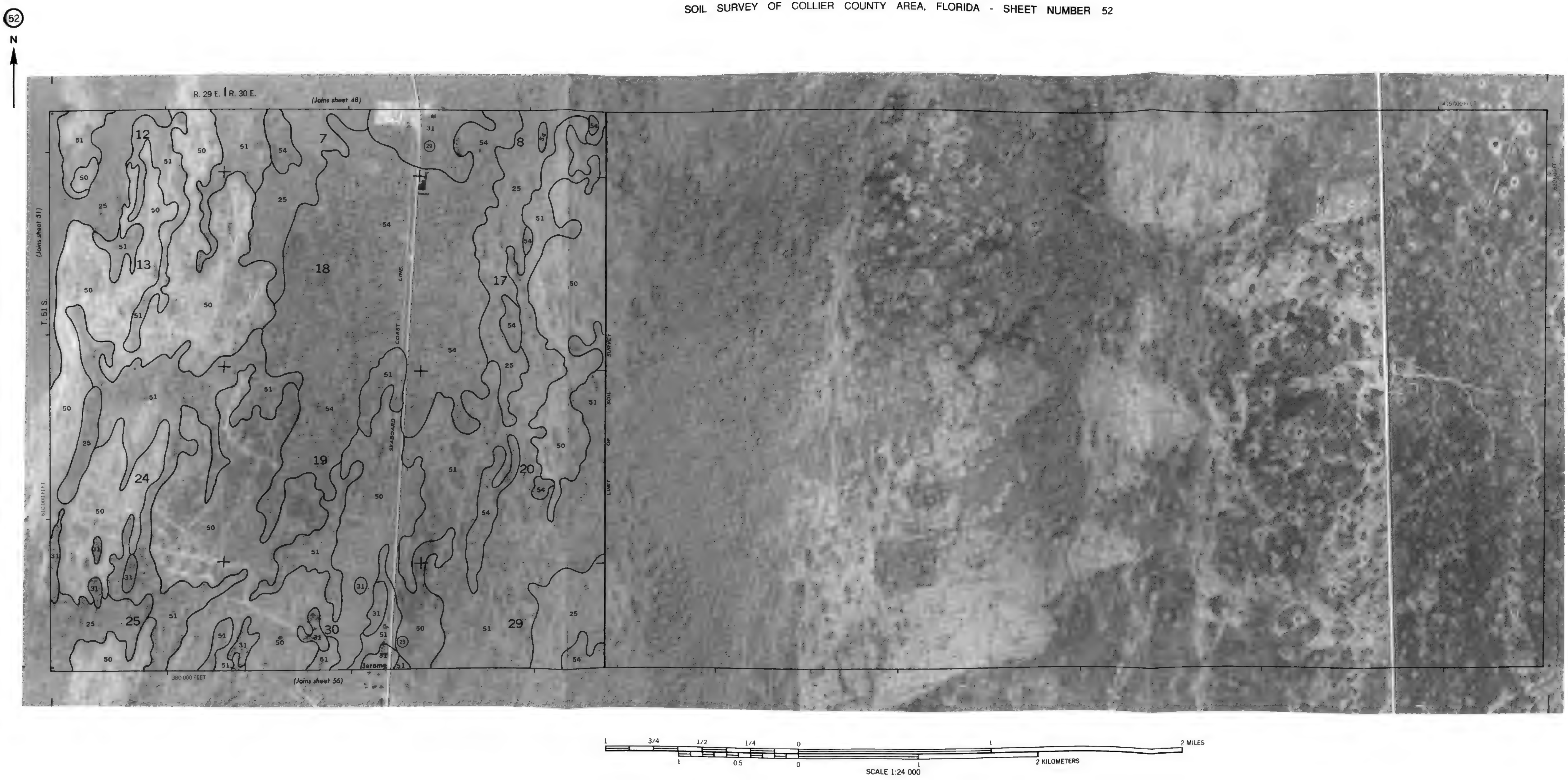


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

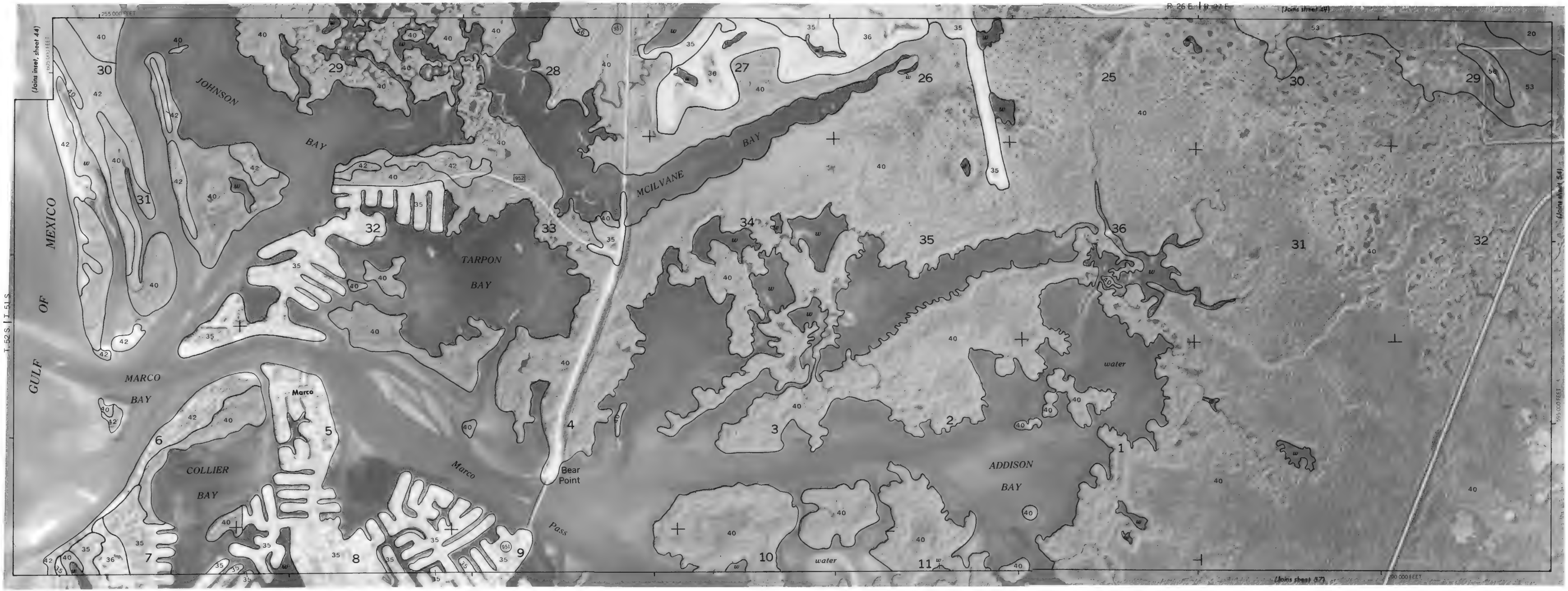
SCALE 1:24 000


51
N
R. 28 E. | R. 29 E.
340 000 FEET
620 000 FEET
(Joins sheet 47)
(Joins sheet 50)
(Joins sheet 52)
(Joins sheet 55)
T. 51 S.
375 000 FEET
Turkey Prairie
Dollar Prairie
Doe Prairie
Plate Prairie
Little Whitney Prairie
Starvation Prairie
DAN HOUSE PRAIRIE
FOUR STAKE PRAIRIE
Royal Palm Hammock
FAKAHATCHEE STRAND
2 MILES
2 KILOMETERS
SCALE 1:24 000


52
N
R. 29 E. | R. 30 E.
(Joins sheet 48)
(Joins sheet 51)
(Joins sheet 56)
T. 51 S.
380 000 FEET
610 000 FEET
SEABOARD COAST LINE
LIMIT OF SOIL SURVEY
Jerome
12
13
7
8
18
17
19
20
24
25
30
29
25
31
29
50
51
54
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

53

N

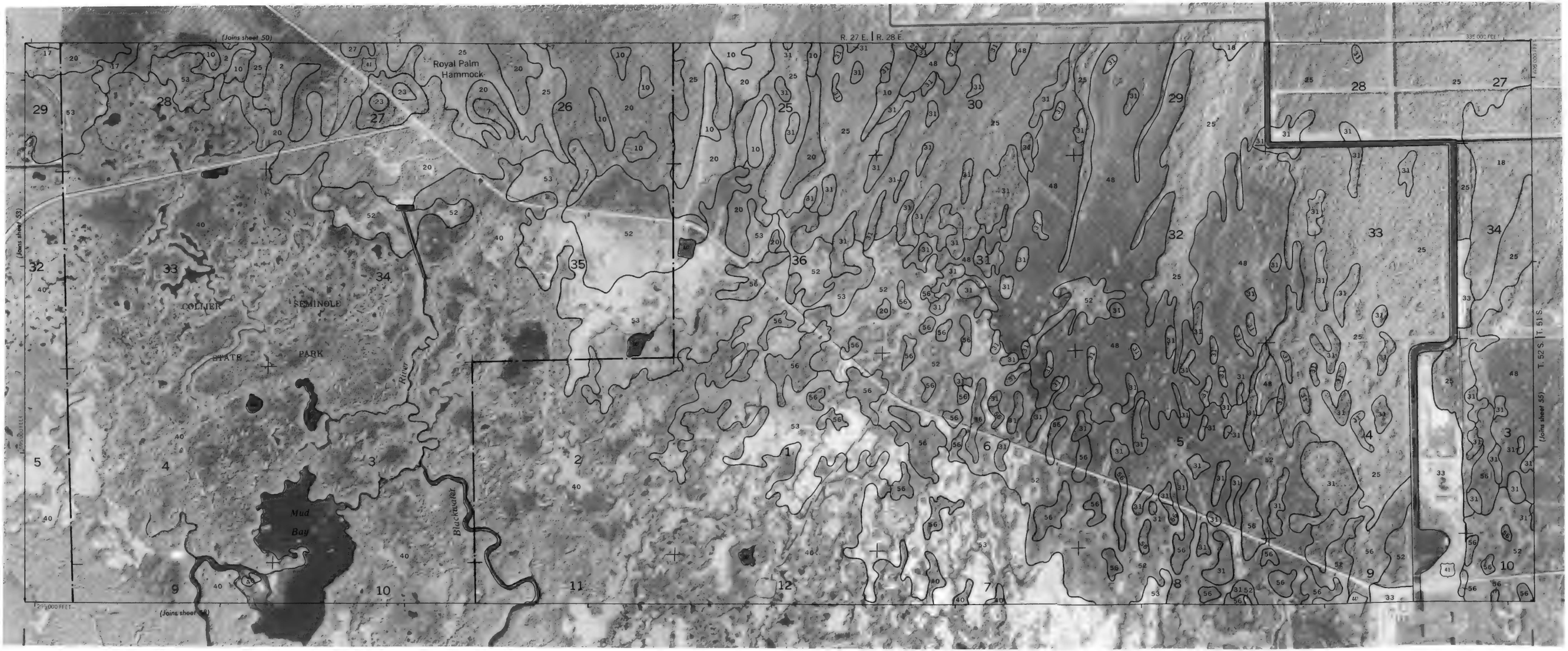


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N



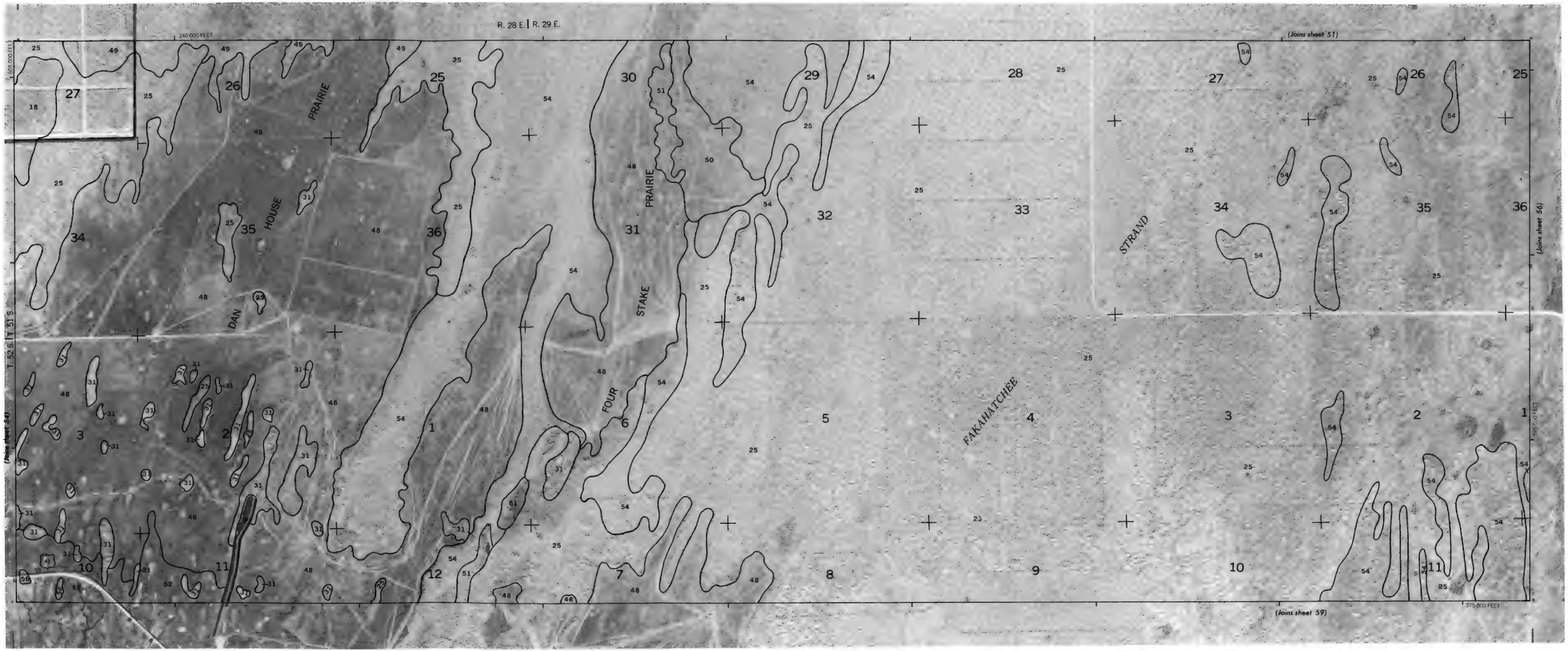
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

55

N



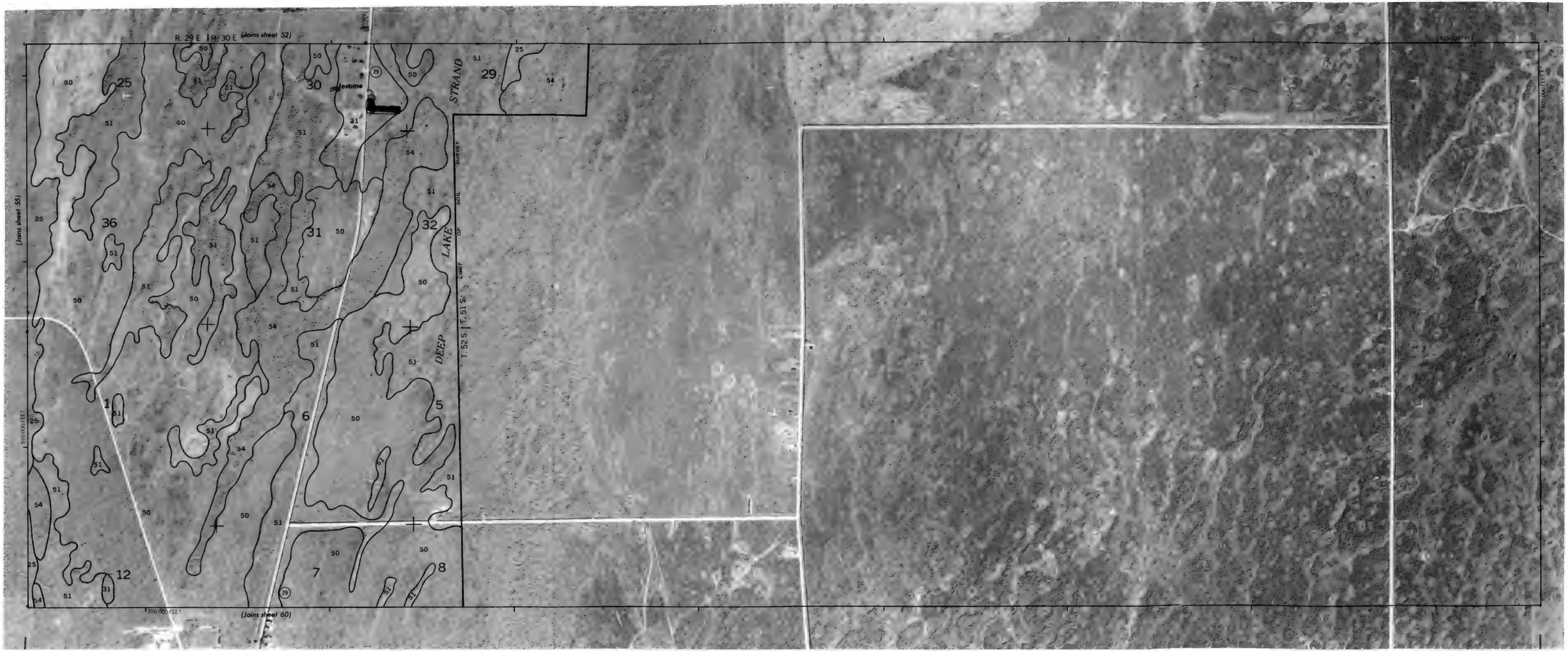
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

56

N

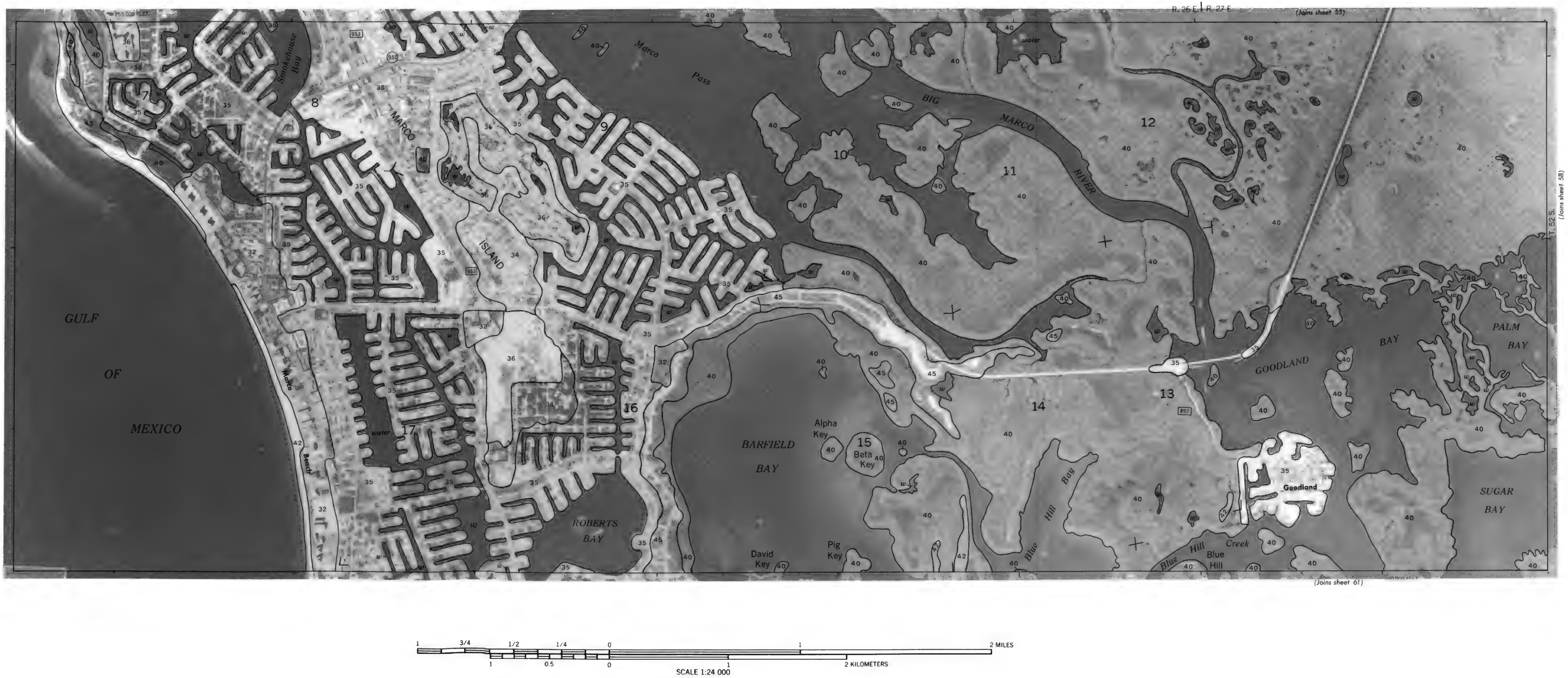


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N


R. 26 E. | R. 27 E.
(Joins sheet 53)
(Joins sheet 58)
(Joins sheet 61)
T. 52 S.
GULF OF MEXICO
Marco Beach
Smokehouse Bay
MARCO ISLAND
Marco Pass
BIG MARCO RIVER
BARFIELD BAY
ROBERTS BAY
Alpha Key
Beta Key
David Key
Pig Key
Blue Hill Bay
Blue Hill Creek
Blue Hill
GOODLAND BAY
Goodland
PALM BAY
SUGAR BAY
water
7
8
9
10
11
12
13
14
15
16
17
953
951
892
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

N

SOIL SURVEY OF COLLIER COUNTY AREA, FLORIDA - SHEET NUMBER 58

1 3/4 1/2 1/4 0 1 2 MILES

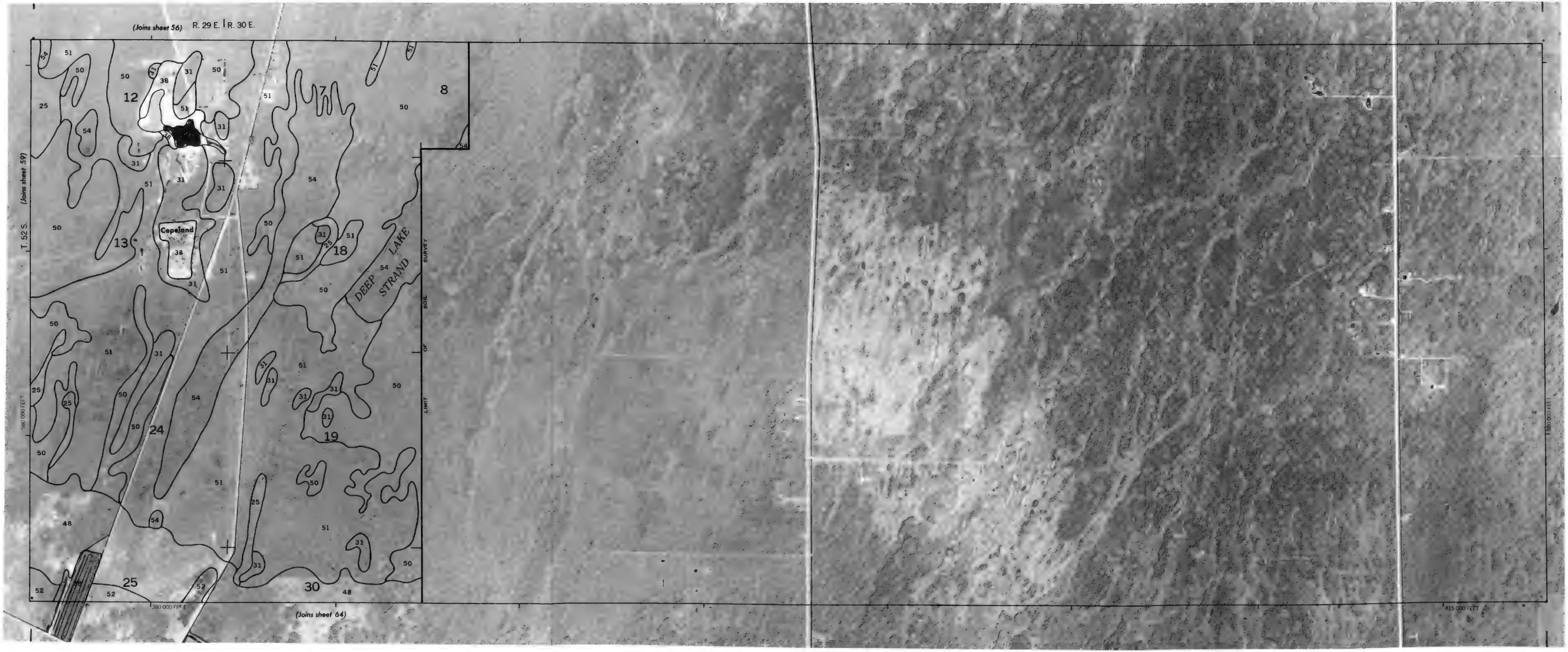
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


59
N
R. 28 E. | R. 29 E.
340 000 FEET
(Joins sheet 55)
(Joins sheet 58)
(Joins sheet 60)
(Joins sheet 63)
T. 52 S.
Weavers Station
FAKAHATCHEE
STRAND
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

60

N



1 3/4 1/2 1/4 0 1 2 MILES

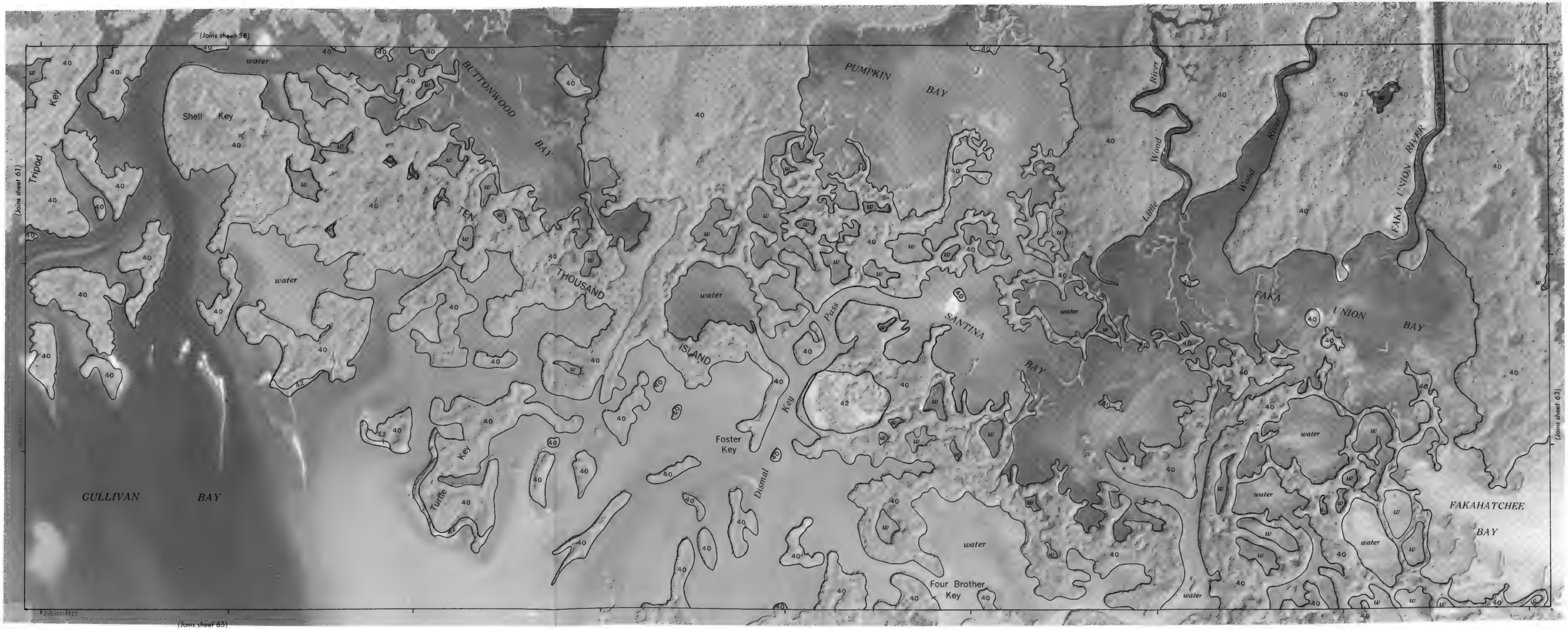
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

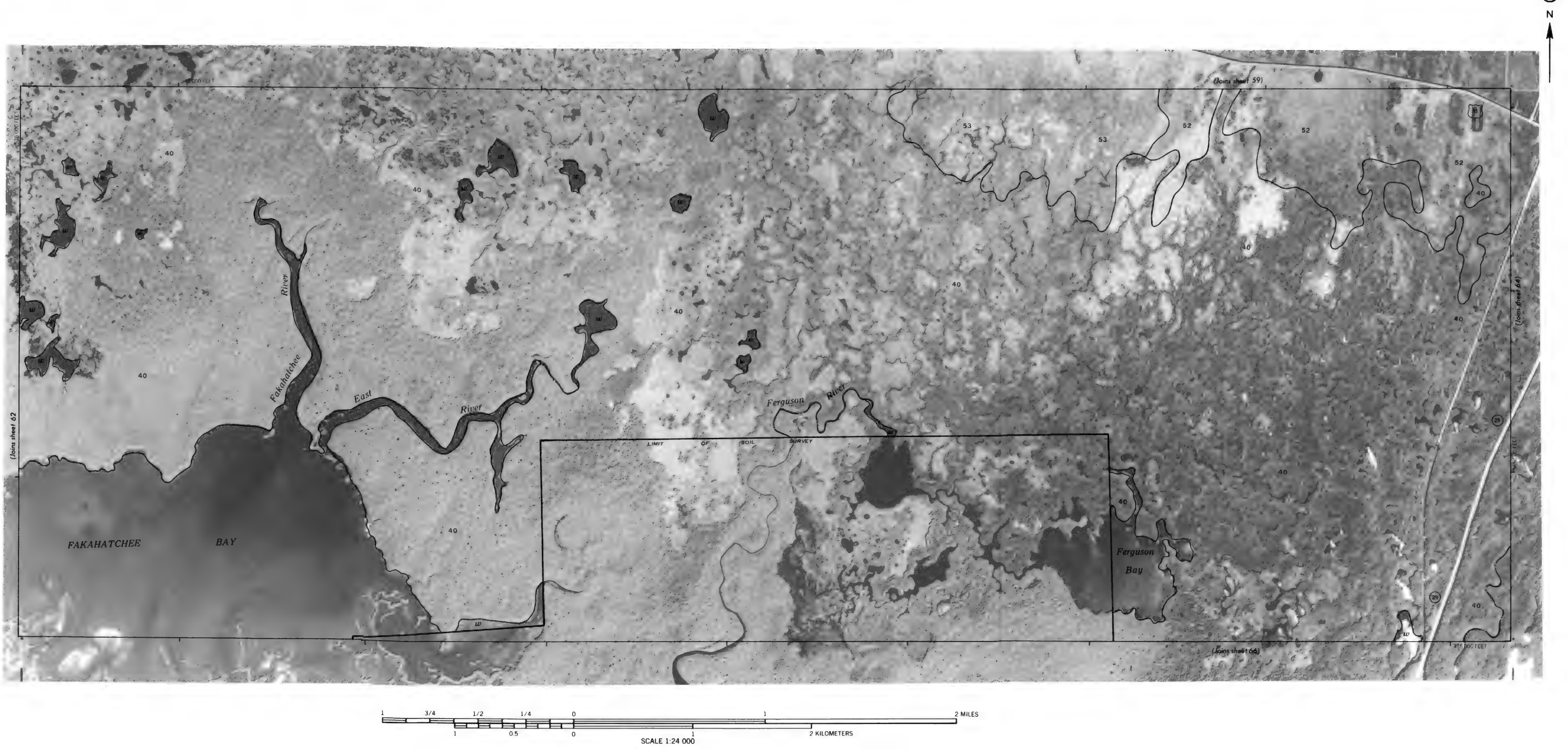

61
N
(Joins sheet 57)
(Joins sheet 62)
(Joins inset sheet 65)
R 26 E
T 52 S
GULF
OF
MEXICO
Caxambas Pass
Dickman Point
Henry Key
CAXAMBAS BAY
Allan Key
Curry Island
Margaret Key
Fred Key
David Key
Pig Key
BARFIELD BAY
Blue Hill Bay
Blue Hill Creek
Blue Hill
COON KEY PASS
Horrs
Ramsey Key
Neal Key
Tripod Key
Coon Key
Little Grassy Bay
Helen Key
Grassy Bay
Kice Island
Blind Pass
GULLIVAN BAY
21
22
23
26
27
28
33
34
35
SCALE 1:24 000
2 MILES
2 KILOMETERS

62

N



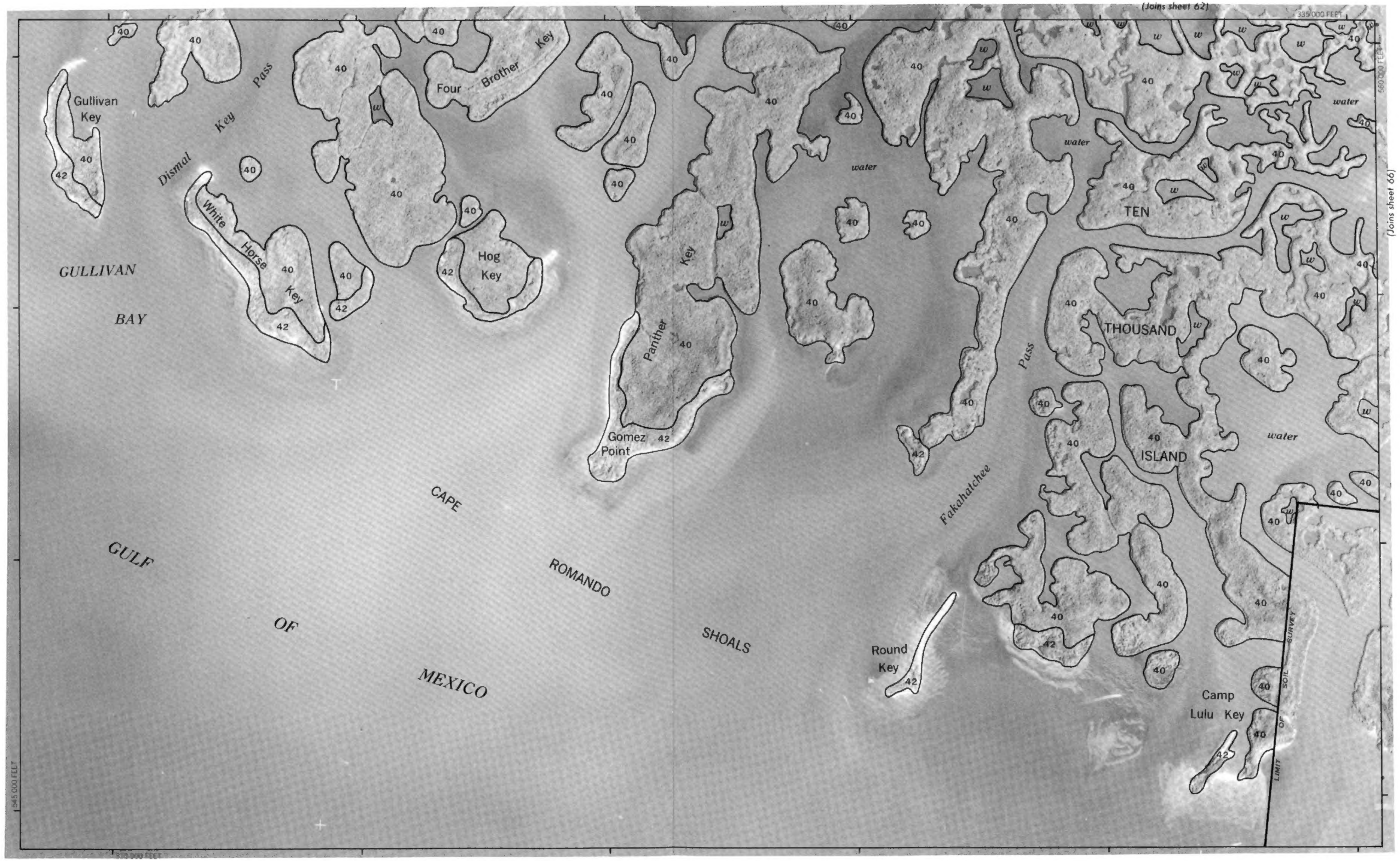
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


63
N
(Joins sheet 59)
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 66)
FAKAHATCHEE BAY
Fakahatchee River
East River
Ferguson River
Ferguson Bay
LIMIT OF SOIL SURVEY
40
52
53
w
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


64
N
(Joins sheet 60)
R. 29 E. | R. 30 E.
Carnestown
(Joins sheet 63)
T. 53 S. | T. 52 S.
LIMIT OF SOIL SURVEY
(Joins sheet 67)
25
30
31
36
40
48
52
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

65

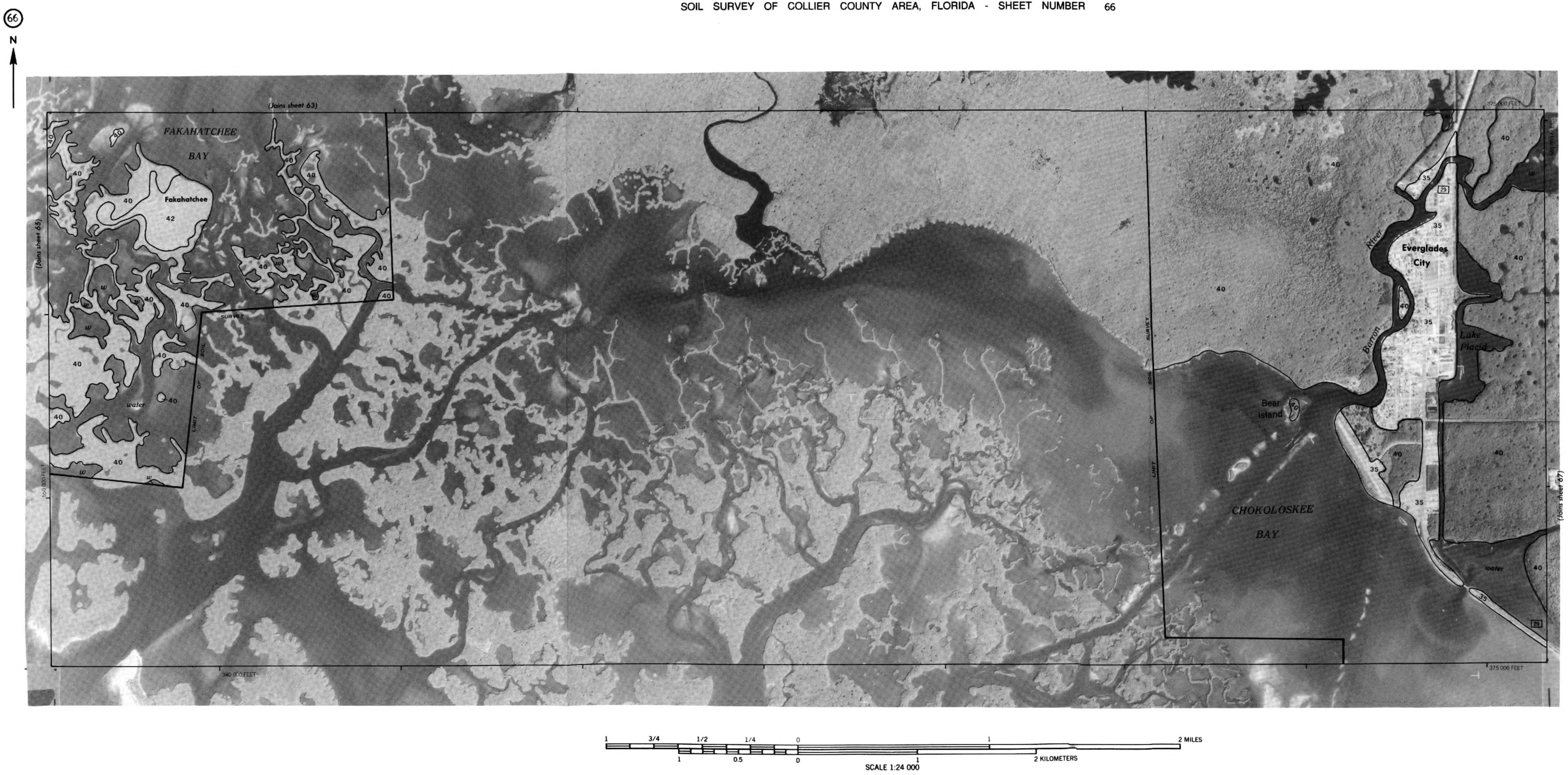
N



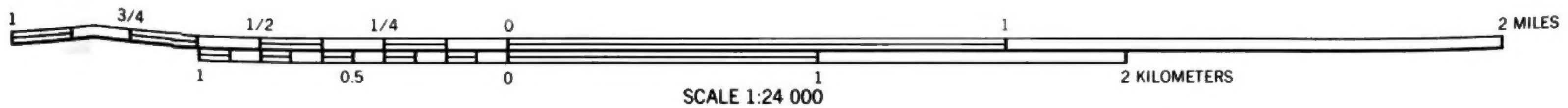
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


66
N
(Joins sheet 63)
(Joins sheet 65)
(Joins sheet 67)
FAKAHATCHEE
BAY
Fakahatchee
CHOKOLOSKEE
BAY
Bear
Island
Everglades
City
Barron
River
Lake
Placid
LIMIT OF SOIL SURVEY
water
340 000 FEET
375 000 FEET
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

N



SCALE 1:24 000